

THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
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AMALGAMATION OF THE RAILWAY ENGINEER WITH THE RAILWAY GAZETTE

The January issue of "The Railway Engineer" was its last issue as a separate publication, and, commencing with this issue, it is now incorporated with "The Railway Gazette," which is enlarged by eight pages weekly, so that in the course of a month the same amount of space will be devoted to the engineering and technical types of article as has hitherto been given in "The Railway Engineer." The advantages of this arrangement are twofold, in that a certain amount of duplication will be avoided and a quicker presentation of technical and engineering articles of topical interest will be given.

Deutsch ist die Saar

ON the crest of a wave of patriotic enthusiasm, more than 90 per cent. of the electorate of the Saar Territory voted on Sunday for return to the German Fatherland in preference to prolonging the *status quo* (government by the League of Nations) or transferring allegiance to France. For some days previously the result had been anticipated confidently in Germany and the railway stations garlanded and inscribed (we reproduce on page 114 a photograph of the bedecked Friedrichstrasse station in Berlin). The railways in the Saar Territory, which will

come under the Reichsbahn when transfer details are completed, have a length of about 271 miles. Of this total 21½ miles are worked by the Alsace-Lorraine Administration. The remainder, consisting of 196 miles formerly belonging to the Saarbrücken Division of the Prussian State Railways and of 53½ miles included in the Palatinate Division of the Bavarian State Railways, has been since 1920 under the absolute control of the League of Nations Commissioner entrusted with the charge of Public Works. The staff, numbering 12,500, is mainly German, and salaries, wages, and conditions of employment are comparable in the main with those prevailing in Germany, so that, although the Reichsbahn was not created when the Saar became temporarily detached, operating conditions under the new régime will not come strange. As we observed in an editorial article on page 420 of our issue of September 14 last, the railways in the Saar Territory, though small in extent, cannot be regarded as in any way comparable with a system of local interest. They form a nest of international lines of great importance both from an economic and a strategic point of view, and also constitute in effect a huge shunting depot.

* * * *

The Week's Traffics

Passenger train traffics of the four group companies all show increases for the past week, and for the two weeks of the present year the aggregate gains in these traffics are £26,000 for the L.M.S., £22,000 for the L.N.E., £6,000 for the Great Western, and £15,000 for the Southern, which are encouraging. Coal traffics to date, on the other hand, are uniformly down, due no doubt to the milder weather. Merchandise takings show some variation in the fortnight, the London & North Eastern having an increase of £9,000 and the Great Western one of £6,000. The London, Midland & Scottish has a decrease of £23,000, and the Southern one of £4,000. For the corresponding fortnight of 1934 the L.M.S. had a merchandise increase of £98,000, the L.N.E. one of £75,000, and the Great Western one of £42,000.

	2nd Week				Year to date.	
	Pass., &c.	Goods, &c.	Coal, &c.	Total.	Inc. or dec.	%
L.M.S.R.	4,000	11,000	1,000	6,000	15,000	0.74
L.N.E.R.	2,000	11,000	11,000	20,000	18,000	1.19
G.W.R.	2,000	5,000	3,000	4,000	2,000	0.23
S.R.	6,000	5,000	8,000	7,000	4,000	0.63

* * * *

Public Works and Unemployment

We commented in our issue of May 13, 1932, on the first report issued by the Council of the League of Nations as a fruit of its investigations into the schemes of national public works for the relief of unemployment undertaken by the Member States of the League. On page 87 this week we refer to the publication of a new report on this subject, embodying the replies submitted to the Council's questionnaire by twenty-nine countries. The reply from the Government of the United Kingdom concludes with the observation that the experiment of large-scale public works specifically to relieve unemployment has been tried and has failed, and it is not intended to repeat it. Such failure might have been foreseen had it been realised that the problem was being approached from the wrong end. Employment is created by the demand for commodities, and if the prospective consumers are unable to afford them, it stops just as soon as the impetus derived from a grant to the producers is exhausted. The British Government's memorandum gives the League Council a hint when it mentions the desirability of cheap and plentiful capital as a stimulus to trade, but in essence this is as futile as loans for public works and for the same reason. How to give higher incomes to consumers to enable them

to buy what their labour and machinery produce would be a more useful investigation than that of problems which can doubtless best be solved by the countries themselves concerned.

* * * *

London Transport Staff and Wages

Following negotiations with the trade unions concerned, the London Passenger Transport Board has decided that as and from the first full pay period after April 1, the percentage deductions of $2\frac{1}{2}$ per cent. from all earnings at present operating, shall be reduced to $1\frac{1}{2}$ per cent., and that as and from the first full pay period after June 1, all percentage deductions from earnings shall cease. In a message to the staff, Lord Ashfield said that the board relied upon each and every member co-operating in efforts to make the services increasingly popular with the travelling public, and to secure that additional patronage which the financial obligations of the board required. Apart from the percentage deductions, it was inevitable that many problems affecting the staff, now numbering roundly 76,000, would arise for consideration and decision, in view of the large number of undertakings transferred to London Transport. For some considerable time discussions have taken place between representatives of the board and the trade unions concerned, and the board is now happy to announce that these matters have been settled. Many anomalies both as regards wages and conditions of service have been removed; disparities in the wages of certain grades of employees have been adjusted; and agreements and promises entered into by undertakings before they were transferred to the board have been given effect to.

* * * *

Overseas Railway Traffics

Since the beginning of 1935 the Argentine exchange has slightly improved to 17.04 pesos to the £, and comparison is now made with a period when the exchange rate was as low as 16.87. Unfortunately there has at the same time been a decrease during the fortnight in currency receipts on the Buenos Ayres & Pacific, Buenos Ayres Western, and the Central Argentine, although the currency earnings of the Buenos Ayres Great Southern are better and it has made a net gain of £4,621 in sterling receipts in the two weeks. The Argentine North Eastern and the Entre Rios have been showing increases both in sterling and currency for the fortnight. The Canadian Pacific ended its year with a gross traffic increase of £2,254,600.

Railway.	No. of Week.	Weekly Traffics.	Increase or Decrease.	Aggregate Traffic.	Increase or Decrease.
Buenos Ayres & Pacific	28th	70,423	- 11,083	1,924,091	- 348,326
Buenos Ayres Great Southern	28th	167,371	- 323	3,494,061	- 871,914
Buenos Ayres Western	28th	43,427	- 7,492	1,166,059	- 306,754
Central Argentine	28th	127,670	- 9,431	3,221,128	- 578,004
Canadian Pacific	1st	369,400	- 10,200	-	-
Bombay, Baroda & Central India	40th	173,475	+ 4,575	6,086,325	+ 268,425

* * * *

Colonial Railway Development

The paper on "Railway Development in the Colonies" read by Brig.-Gen. F. D. Hammond, C.B.E., D.S.O., to the Royal Empire Society on January 15, and abstracted on pages 94 and 95 of this issue, concludes with a review of the present situation in British Africa as regards the prospects of new construction. The few thickly populated areas are already served by railways, and the large tracts where inhabitants are sparse are now unlikely to be conceded a line even for administrative reasons, as so often happened in the past, since the motorcar is to-day the favoured vehicle for officials visiting the interior. Brig.-Gen. Hammond is well known for his reports on

railways in British colonies and protectorates, and his judgment that for many years to come very few railways will be built in British Africa accordingly commands respect. It may even be asked whether this cautious remark was not optimistic, for if railway building must wait upon the development of population it may have to wait a very long time, and then find that the new inhabitants are patronising the road transport facilities which induced them to become settlers. There is still room for railway pioneers, who now have in the diesel engine a new weapon.

* * * *

Engineering in the East

Another paper read to the Royal Empire Society last Tuesday which dealt with a subject of interest to all concerned with communications was that by Mr. J. S. Tritton, M.Inst.C.E., M.I.Mech.E., on "Ports, Bridges and Railways in the East." How modern engineering methods fulfil the requirements of those parts of the world where industry is developing in the face of natural difficulties formed an impressive story, from which emerged an encouraging vista of increasing activity in trade, either actual or potential. The engineer, at least, has adapted himself to modern conditions by showing how to combine economy with efficiency and convenience, and if the lessons in rationalisation which are taught by his work are taken to heart, there should be a brighter outlook for enterprise in general. Bridge building and railway working exhibit the most striking examples of how principles of standardisation have been applied. The production of twenty-six new locomotive types to fulfil the requirements of the whole of India demonstrates how much unnecessary effort can be saved by the systematised study of transport problems. Machinery is sometimes reviled as the root of economic ills, but Mr. Tritton's paper must have confirmed his hearers in the opinion that the fault lies rather with its users than its creators.

* * * *

The Boroughbridge Branch Signalling

In our issue of January 11 we summarised the remarks made on the previous evening by Mr. A. E. Tattersall in a lecture before the York Lecture and Debating Society, so far as they related to the modifications made in the signalling of the Boroughbridge branch, which connects the York-Northallerton main line with the York-Harrogate at Knaresborough. It is 12 miles in length, with three intermediate stations, and has so little traffic that four locomotives suffice for the branch. The modifications consist of the removal of the usual distant and home signals and their replacement by "location" and "section limit" boards, together with a "station" board on the platform. The L.N.E.R. official announcement, issued this week, gives, in a condensed form, the details of the equipment on the boards and relates how they will be picked up by the powerful headlamps that are to be provided on the locomotives. The controlling of the points by the train-staff, as related by Mr. Tattersall and in the official notice, is not, of course, a new departure as it is, in effect, the Annett Lock, invented sixty years ago. It is instructive to note that the experiment is being made with the sanction of the Ministry of Transport.

* * * *

Rohilkund & Kumaon Railway

An advance of Rs. 4,03,993 in earnings for the year ended September 30, 1934, furnished by both coaching and goods traffic, was accompanied by a rise of only Rs. 48,407 in working expenses, so that net earnings showed an improvement of Rs. 3,55,586. Including

£9,696 (against £8,642) share of surplus profits from the working of the Lucknow-Bareilly State Railway of 312 miles, the net profits realised £141,256 compared with £122,047 in the previous year, and the total distribution to stockholders for the year 1933-34 is 16 per cent., against 15 per cent. for the two previous years. Passenger numbers improved in all four classes, and passenger receipts in all but the first. In goods traffic the principal increases occurred under sugar cane, sugar and gur, jagree and molasses, but there was a heavy falling off in railway materials, grains and oil seeds.

	1933-34	1932-33
Passengers	6,641,966	6,346,804
General merchandise, tons	1,185,920	923,557
Operating ratio, per cent.	45.51	47.61
Train-miles	894,810	863,355
Mean mileage	573	573
	Rs.	Rs.
Coaching receipts ..	27,05,238	26,02,804
Goods traffic receipts ..	39,28,207	35,78,079
Total earnings	68,59,478	64,55,485
Working expenses ..	31,21,494	30,73,087
Net earnings	37,37,984	33,82,398

The Fastest Train in America

A new schedule of a remarkable description was introduced in America over the metals of the Chicago & North Western Railway on January 2 last; and despite the high speed experimental runs made recently by the Burlington Zephyr and the Union Pacific six-car diesel-driven train, it is another tribute to the still unexplored possibilities of steam traction that steam is responsible for maintaining the accelerated times. At one clean sweep 2 hr. 50 min. have been cut from the quickest time previously operating between Chicago and the Twin Cities of St. Paul and Minneapolis, and a 7-hr. run has been instituted between Chicago and St. Paul in both directions. The distance is 408.6 miles, and the run includes a 5-min. stop at Milwaukee, and shorter stops at Adams and Eau Claire. In the westbound direction The Four-Hundred covers the 85.0 miles from Chicago to Milwaukee in 80 min., and the 124.5 miles thence to Adams in 117 min., thus making two successive start-to-stop runs at 63.8 m.p.h.; in the reverse direction the 113.6 miles from Eau Claire to Adams are booked at 58.2 m.p.h., the 124.5 miles thence to Milwaukee at 60.7 m.p.h., and the Milwaukee-Chicago stage at 63.8 m.p.h. The running time for the complete distance of 408.6 miles between Chicago and St. Paul is thus 415 min., and if the slowing down to and restarting from three stops be deducted, a net running average of more than 60 m.p.h. is called for over the entire distance. The train consists of five modernised air-conditioned cars hauled by an oil-burning Pacific locomotive with 6 ft. 7 in. driving wheels. The scheduled average of 63.8 m.p.h. over the 209.5 miles from Chicago to Adams makes it the fastest train in the American continent for the distance covered.

Railcars and Regulations in Spain

The paralysing effect of bureaucracy on the Spanish railways is exemplified by the attitude of Government inspecting officers to the introduction of railcars, the advent of which was evidently not foreseen when the present regulations were drawn up. Our contemporary *Ferrocarriles y Tranvías*, in an article on the railcar question, pleads for some relaxation of the official regulations in order to facilitate the adoption of these vehicles, which to some companies, especially those operating lines in sparsely populated districts, afford the principal means whereby they may effect economies and even regain lost traffic. The hopes entertained by owners of such cars have apparently been considerably damped by the atti-

tude taken up by Government inspecting officers, who insist on enforcing the strict letter of the regulations regarding construction and working, whereby unnecessary expense, as the companies see it, is occasioned and much of the advantage to be obtained from railcar working nullified. Pending a revision of the rules, the officers are admittedly in a difficult position. It is, however, contended that they ought not to be content to explain that it is not their business to alter matters; rather should they use their influence with the authorities to get some relaxation of the rules. The postal authorities have already set a good example, it is pointed out, by agreeing to allow the mails to be carried on railcars in the same manner as on road vehicles and not insisting on the provision of a special compartment for their bags.

Wood or Steel Sleepers?

Correspondence still continues in *The Times* on the relative merits of wood and steel sleepers. Most of the letters so far published, as we have recorded from time to time, have been in advocacy of the steel sleeper, but a letter appeared in *The Times* of January 10 from Mr. Russell Latham, Chairman of the Timber Development Association Limited, in support of timber for sleepers. He quoted Mr. Beaton's letter of December 3 in which the writer had instanced wooden sleepers laid in South Africa in 1903 and which were found to be in first class condition 18 years later, whereas steel sleepers laid in 1892 had to be removed after eleven years for the reason that 90 per cent. had sustained some damage. Although the wooden sleepers were stated to have carried axle loads of 18 tons at a maximum of 50 m.p.h. as opposed to axle loads of only 15 tons and no higher speed than 45 m.p.h. over the steel sleepers, comparisons of this sort are of little value. The design of the steel sleepers may have been faulty and may have been the sole cause of the trouble. The matter cannot be settled by means of correspondence in the lay press, for there are so many variables to be taken into consideration in every instance when there is a choice available. There is little doubt that both steel and wooden sleepers can give equally satisfactory service, and there is probably not much to choose as regards cost in the long run if the circumstances governing their use are suitable.

Railway Maintenance Problems

The engineer in charge of railway maintenance is apt to be up against all sorts of odd and unexpected problems in the solution of which he will find little help in standard text books. One result of this is that certain recurring difficulties are often not dealt with in the most satisfactory way. It may seem extraordinary, but nevertheless it is far from unusual—or was until a few years ago—that the axiomatic principle of railway constructional work, good drainage, should be all but ignored by comparatively large numbers of railway engineers. Again, the best method of dealing with earth slips—and there always is a best way—is often not adopted, and the resultant trouble and expense may be very considerable. It is probably because such elementary but essential matters are not generally covered in text books that there remains so much ignorance about them. In a series of articles, the first of which we publish on page 92 of this issue, a former District Engineer will place on record his experiences in railway maintenance. We think it will be agreed that, taking into consideration all the local circumstances, they were all based on common sense, and that therefore they may be taken as a general and useful guide through a hitherto badly charted country.

"The Railway Gazette" and "The Railway Engineer"

WITH the present issue we produce the first number of THE RAILWAY GAZETTE in its enlarged form following the merger with *The Railway Engineer*. The amalgamation is briefly announced in the first column of page 81, and the new heading blocks adopted for the first time this week give evidence of the development. *The Railway Engineer* completed with its January number 55 years of monthly publication and also its last volume as a separate journal. When No. 1 was issued in February, 1880, an introductory leader under the heading "The Reason Why" set forth the intentions and scope of *The Railway Engineer*, in the following terms:—

To provide ample space and opportunity for exhaustive reviews on matters relating to railway engineering, and

To build up, page by page and number by number, a work of reference, which, by the aid of copious subject indexes, will ultimately become the encyclopædia of the profession.

At that time the need for such a specialised paper was great, for the weekly railway Press was concerned mainly with finance and, to a lesser degree, with operating matters. *The Railway Engineer* was a pioneer in its appreciation of the importance of the engineering and manufacturing sides of railway activity, and of the value to progress which was to be secured by the accurate ventilation of both developments and problems. The policy laid down in the first number has throughout guided the contents of subsequent issues, and the volumes for the past 55 years testify to the measure of success it achieved. An outstanding feature has always been the high standard of line drawing used to illustrate descriptive articles. For many years past all drawings have been produced by staff draughtsmen in accordance with the style which experience has shown to be most suited to the particular need of the railway engineer.

Within more recent years two notable changes have taken place in the weekly railway Press, namely, increasingly detailed attention has been paid to engineering matters, and the process of amalgamation (coincident with the merging of British railway systems into the present four groups) resulted in the emergence of THE RAILWAY GAZETTE as one strong and representative weekly journal comprising the best features of the many erstwhile competitive weeklies, one of which—that for many years known as *Herapath's Railway Journal*—was founded a century ago. A stage further in the amalgamation process was reached in 1919 when *The Railway Engineer* came under the control of the proprietors of THE RAILWAY GAZETTE and the late Mr. S. Richardson Blundstone, Wh.Sc., who had been Editor and principal proprietor since 1889, retired. Since that time *The Railway Engineer* has been under the same editorial direction as has THE RAILWAY GAZETTE, and the co-operation between the two papers has been both intimate and mutually beneficial.

The complete fusion which has now taken place has been arranged after long and careful consideration in order to supply the modern railway industry with the trade and technical journal most suited to its needs. A growing appreciation of the interdependence of the mechanical and operating services resulted in the subscription lists of the two papers containing many names in common. In such circumstances there could be no useful purpose in holding back certain types of articles until the appearance of the monthly paper. *The Railway Engineer* usually contained 32 pages of reading matter, and, in order that the subjects hitherto dealt with may be adequately covered in the combined publication, THE RAILWAY GAZETTE is now

enlarged by 8 pages weekly, giving a total of 32 additional pages over a month. From this week onwards the enlarged RAILWAY GAZETTE will include week by week, in addition to its familiar features, the many line drawings and full technical articles which have for so long been recognised as the speciality of *The Railway Engineer*. THE RAILWAY GAZETTE is thereby enabled to offer in one weekly journal a complete review of technical and manufacturing progress as well as operating and general railway news.

* * * *

The Paris Ceinture

PLANS for the reorganisation of the Paris Ceinture lines were approved early last year by the Conseil Supérieur of the French railways, and a recent issue of the *Journal Officiel* sets out the decree approving the reorganisation arrangements which were agreed on August 27 by the parties concerned. The Grande Ceinture, or Outer Circle, 147 km. in length, runs in a wide sweep round the outside of Paris. It is worked under a concession, which expires on December 31, 1958, held by the Nord, Est, Orleans and P.L.M. Companies, and the State Railways (as successors to the Ouest Company), holding equal shares in it and united in the Syndicat du Chemin de fer de Grande Ceinture de Paris. There is a board of management composed of representatives of the five administrations. The line is now used almost exclusively for the diversion of long-distance through traffic from the inner suburban area.

The Petite Ceinture, or Inner Circle, 31.5 km. in length, runs just inside the path of the old fortifications, and is directly connected with the principal termini of the main line railways entering Paris, with the exception of the Gare de Luxembourg. Its concession expires on December 11, 1952. The *rive droite* section, from Clichy via Menilmontant to Pont de Bercy is conceded to the Est, Nord, Orleans, and P.L.M. Companies and the State Railways (as successors to the former Ouest Company), holding equal shares in it and united in the Syndicat du Chemin de fer de Ceinture de Paris. For the Petite Ceinture also there is a board of management consisting of representatives of the five administrations. The *rive gauche* section, however, from the Pont de Bercy to Auteuil—Boulogne, Courcelles, and Clichy, originally conceded to the Ouest, now belongs to the Etat, and Ceinture trains pay toll over this portion. Before the war a fast and frequent steam passenger service was maintained right round the Inner Circle. Afterwards the services were split, steam trains serving separately the Northern zone, and the Southern zone between Bercy and Auteuil. The remaining section, which has not for some time been used by the Ceinture except for freight purposes is now electrified, and the Etat maintains an electric passenger service over it. Since July 22 last regular passenger services on the Petite Ceinture have ceased, except on the electrified Etat portion. They had been running since 1868.

Under the new arrangement, which is expected to result in substantial economies, the working of the Grande Ceinture is entrusted to the Est and Nord Companies and to the Etat, except that the Orleans Company will continue to work the section of the Massy-Palaiseau to Villeneuve St. Georges strategic railway which lies between Massy-Palaiseau station and its junction with the Paris-Orleans main line. The Est is to work the portion between Noisy-le-Sec and Sucy-Bonneuil via Nogent-sur-Marne and le Plant-Champigny. Operation of the western portion of the Grande Ceinture as between Juvisy

station and the junction line at Bourceron which gives access to Argenteuil-Triage station is entrusted to the Etat. The Nord will work the eastern route between Bourceron and Juvisy, including the section between Plaine-Saint-Denis and Pantin, the alternative line from Bobigny to Noisy-le-Sec and Sucy-Bonneuil, the junctions of this alternative line with the Paris-Strasbourg and Paris-Mulhouse lines, and the Valenton-Juvisy service junction line now under construction. To the Nord is also given the working of the Petite Ceinture lines and of the link between Courcelles and the Avenue de Clichy.

The decree sets out in some detail the financial particulars of the new arrangements. Receipts from each section must be accounted for by the working company concerned, to the *administration supérieure* on behalf of the concessionary syndicates. Expenses are in general to be divided in accordance with the principles laid down in the Convention of 1921 as modified in July, 1933, but the method of their apportionment may be varied by a special decision of the *comité de direction* on the application of the company concerned in case of a material change in circumstances. This committee will also fix the rent to be paid by toll-paying trains for the use of the sections worked in common. Any surplus or deficit resulting after providing for working expenses will be divided equally between the five great railway administrations with the following exceptions. Each of the four companies forming the Grande Ceinture syndicate will continue to be responsible for one quarter of the interest charges on the capital of the Grande Ceinture; the Etat will also bear, as before, the charges on the capital of the *rive gauche* section of the Petite Ceinture, and of the Courcelles junction line; and each of the five great railway administrations will still be responsible for the charges on the capital of the *rive droite* section of the Petite Ceinture. Arrangements are made for the transfer to the working administrations of the sections to be worked and the necessary rolling stock and plant, and it is left to the working administrations to provide, on behalf of the syndicate, the additional rolling stock and equipment required for the Grande Ceinture. The Nord will furnish, on behalf of the Syndicat de Ceinture de Paris, any additional material needed on the Petite Ceinture.

The Ceinture *rive droite* was opened in 1852 and worked by the *Comité des Ceintures* of the five administrations, whereas the *rive gauche*, opened in 1867, was first worked by the Ouest. But, while the Grande Ceinture was under construction, the two syndicates agreed to the formation of the *Syndicat d'exploitation des deux Ceintures*, which from December, 1880, virtually controlled the working of the two systems. Under the present reorganisation this joint syndicate remains in being but has delegated its operating functions to the administrations concerned.

* * * *

An Opportunity for Steam

THE rapid introduction of high speed diesel engined railcars and trains and the excellent performance which some of them are giving in everyday service, as for example in Germany, as well as special runs of a more spectacular nature, have prompted a reply from the designers and builders of steam locomotives. Already we have described in our pages the recent record breaking run on the L.N.E.R. from London to Leeds and back with a locomotive of ordinary design, as well as proposals from various quarters for a streamlined train with a specially-designed locomotive, such as that from the well-known Continental firm of Henschel & Sohn, Kassel. Now comes an official announcement in our German contemporary *Organ für die Fortschritte des Eisenbahnwesens*,

that the Rhine-Westphalia Coal Syndicate, of Essen, is offering the sum of 50,000 RM. in prizes for the best designs for a steam driven high speed main line railcar to be fired by coal. The announcement points out that, although the diesel car is now attracting great attention in connection with the plans being developed by the German State Railway for the institution of fast and frequent passenger services between the chief cities of Germany, nevertheless, this scheme is attended with the disadvantage that all the fuel for the trains has to be imported, which is all the more serious now by reason of exchange difficulties. It is therefore most desirable to look for some way of utilising a home-produced fuel of which Germany has an ample supply.

There is little doubt, the statement continues, that the present state of boiler and steam generating engineering permits of the production of a suitable vehicle if enough attention is concentrated on the problem. The conditions laid down call for a car to burn coal nuts of 30 mm. (1½ in.) and over, having a volatile content of 30 per cent. The vehicle is required to attain a speed of 130 km.p.h. (81 m.p.h.) on the level against a head wind of 12 km.p.h. (7.5 m.p.h.), to seat 180 passengers, second and third class in the proportion of about 1 to 4, with appointments fully answering to modern ideas of comfort and convenience and arranged to allow setting down and taking up passengers rapidly without disturbing the others. Lavatory accommodation, luggage and postal compartments are to be included. Braking power sufficient to give a deceleration of 1.0 m. (3.28 ft.) per sec. per sec. under unfavourable weather conditions is essential. The acceleration at starting is to be 0.4 m. (1.312 ft.) per sec. per sec. and the car must be able to run for six hours on end without any attention to the firing being necessary, so that the driver will have no secondary duties to attend to. There is to be a driving position at each end with a good view of the line, and all necessary indicating gauges and instruments are to be duplicated and visible at a glance. Competitors are required to send in sufficient drawings, descriptions and calculations to elucidate their designs fully, and are to base them on well-known and tried principles, while in the case of new forms of construction for any essential part they are to indicate what firm is willing to answer for their manufacture.

Six prizes are contemplated, the first, of 25,000 RM., to be awarded to the design considered as best answering to all the conditions, the five next best designs receiving 5,000 RM. each. Should it be held that no design meets the requirements well enough to deserve the first prize, the other prizes may still be given to the first five designs, or the sum of 25,000 RM. may be divided among them in such manner as the judges see fit. Their award is final and not open to action at law. The competition is free to all persons and firms, either singly or in association. The examining committee is composed of Herr Fickler, Manager of the Harpener Mining Company, Dr. Knepper, Manager of the Gelsenkirchen Mining Company, Dr. Nordmann, German State Railway, Berlin, Professor Marcard and Professor Roeder, of the Technical High School at Hanover, and Dr. Wiedemann, of the Rhine-Westphalia Coal Syndicate, Essen, to which body proposals are to be submitted under a *nom-de-plume* not later than July 1, 1935. The address of the syndicate is Frau-Berta-Krupp Strasse, 4, Postfach 937. The result of this attempt to create a successful rival to the high speed diesel car will certainly be watched with interest in railway circles. The competition reflects much credit on the promoters, who are naturally interested in promoting the utilisation of the natural resources of Germany, in which they have already invested much capital and enterprise.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

The Double Blast Pipe

Chinthurst Lodge,
Wonersh, Guildford.
January 11

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In connection with the fashion for using double blast pipes or fancy shapes of nozzle, such as were described in the last number of *The Railway Engineer*, there is a consideration which I think is lost sight of, and that is the fact that in service they become rough inside with a hard, furry deposit. Unless they are kept very smooth and clean, it is probable that the section of least surface, namely a circle, is the best in the long run.

Yours truly,
C. F. DENDY MARSHALL

L.N.E.R. Mechanical Colour-Light Signalling

7, Elm Grove Road, Exeter.
December 29, 1935

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In the article describing L.N.E.R. mechanical colour-light signals in *THE RAILWAY GAZETTE* of December 14 (page 975), the use of a colour-light home signal giving three or four aspects when succeeded by a starting signal is illustrated in diagrams 4 and 8, but the notes showed that Rule 39(a) was still observed. Unless the distant signal in the rear is also a colour-light signal (and not provided with a double-yellow aspect) I cannot see why the rule should be observed in clear weather: an operating facility is apparently being neglected.

The reference to the rule in diagram 5 should presumably have been omitted, as no starting signal is shown there.

Yours faithfully,
G. N. SOUTHERDEN

[The Signal and Telegraph Engineer, North Eastern Area, L.N.E.R., informs us that the reference to Rule 39(a) should have been omitted from diagram 5. In the other cases mentioned, observance of the rule is required because the single yellow light in the home signal is not at braking distance from the starting signal, and without a double yellow indication at the distant it would not be satisfactory to allow a train to come up to the home signal showing single yellow, a fundamental principle of colour-light signalling, as used on the L.N.E.R., being that a single yellow light, unless qualified in some manner, means that there is braking distance between it and the red light ahead.—ED. R.G.]

Railcar Services

Fiat Società Anonima,
Turin, January 11

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—We have read the paragraphs in your issue of January 4 entitled "weekend holidays by aeroplane and railcar" and "international Austro-Hungarian railcar service." The disclosures they contain confirm once more the trend taken by modern railway services and the fact that railcars are not to be confined—as it might have seemed at first—to local lines of negligible importance. On the contrary, the enthusiasm with which their introduction has been greeted in all countries induces the belief that railcars will more and more enlarge their field of application, taking over also services which up to now have been reserved to steam traction, namely, special fast services and international direct connections.

Remarkable symptoms of this trend are the new services pointed out by you, and to this we may add that the

Italian State Railways have organised a similar one between Ventimiglia and Oulx. This service allows passengers from the Riviera to reach Sestrières, the well known Italian winter resort 6,000 ft. above sea level, covering 286 km. (171.7 miles) in five hours, including stops and road motor coach journey, and passing through French territory.

Ample room for luggage and skis is provided, and the equipment includes special heating, radio, and a bar. The seating accommodation is for 48 passengers. The railcar used is of the streamline type, propelled by two 120 h.p. petrol engines, and is entirely of Fiat construction. It has the following main features:—

Length, overall, 22.445 m. (73.5 ft.).

Total weight, empty, Kg. 20,500 (20.2 tons).

Maximum speed on level track, 135-140 Km.p.h. (84.87 m.p.h.).

We send you under separate cover photographs of this car (reproduced on page 114). The timetable of this special service is as follows:—

LITTORINA FIAT RAILCAR

Ventimiglia (via Breil-S. Dal-mazzo) ..	dep. 14.55	Oulx ..	dep. 18.50
Cuneo ..	arr. 16.53	Turin ..	arr. 20.10
Turin ..	dep. 16.54	Cuneo ..	dep. 20.17
Oulx ..	arr. 17.53	Ventimiglia (via Breil-S. Dal-mazzo) ..	arr. 21.14
	dep. 17.57		dep. 21.16
	arr. 19.00		

ROAD MOTOR COACH

Oulx ..	dep. 19.10	Sestrières ..	dep. 18.00
Sestrières ..	arr. 19.55	Oulx ..	arr. 18.45

Yours faithfully,
FIAT, SOCIETÀ ANONIMA,
SEZIONE AUTOMOBILI

The British Industries Fair

Imperial Chemical House,
Millbank, Westminster, S.W.1.

January 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Before I leave for a business visit to South Africa, may I say a word with reference to the forthcoming British Industries Fair.

Great Britain's comparative prosperity among the manufacturer nations is accepted on all hands to-day as a fact of nature like the rising of the sun. But if our privileged position is to be maintained and strengthened, we cannot too often be reminded that prosperity, in common with most other benefits worth securing, is the result of planning and constant work.

Such a reminder arrives appropriately in these early weeks of a new year with the announcement of the nations sending most buyers to the British Industries Fair which opens in London next month. They coincide almost exactly with the list of countries which increased their imports of British goods during the first nine months of 1934. We sent more goods to Holland, Denmark, Italy, Belgium, Sweden, Norway, and Switzerland, all of them countries from which large numbers of buyers will arrive in London in February, and in Birmingham when the Engineering and Hardware Section opens in May.

Our fair, in short, is a fine example of results to be gained for British manufacturers, and their work people, by intelligent planning and steady work from year to year, and the fair is in my opinion worthy of the support of all those connected with the industry and commerce of the country. We can with profit study the method of its achievement and refrain from taking prosperity for granted.

Yours faithfully,
HARRY MCGOWAN

PUBLICATIONS RECEIVED

National Public Works. (Organisation for Communications and Transit). League of Nations Publication No. VIII. 1934. London: Geo. Allen & Unwin Ltd., 40, Museum Street, W.C.1. 10½ in. × 8 in. 281 pp. Price 12s. net.—This publication comprises the replies by 29 governments to the questionnaire addressed to them by the Council of the League of Nations relating to national schemes of public works for the relief of unemployment. Further reference to the report will be found on page 81 of this issue.

Road and Rail in Forty Countries. Report prepared for the International Chamber of Commerce. By Dr. Paul Wohl and Prof. A. Albitreccia. London: Humphrey Milford, Oxford University Press. 7½ in. × 5½ in. × 1 in. 455 pp. and folding tables. Price 18s.—This is a book that moves the reader to admiration. First, for the courage of the compilers in tackling such a huge task, and secondly for the thoroughness and expedition with which they have carried it through. When, in November, 1933, the International Chamber of Commerce issued the preliminary report on rail and road transport,* based on a draft prepared by Brig.-Gen. Sir. H. Osborne Mance, it foreshadowed a volume of facts and figures, but there could not have been many who foresaw that the work would have been so comprehensive and valuable as it has proved to be, or that it would appear so soon. The International Conference that is to endeavour to work out some method of co-ordinating rail and road transport will, with the aid of this volume, be able to obtain a picture of the situation in different parts of the world, while the authorities in the various countries who are trying to work out their own solutions should benefit greatly by having the information regarding what is being done elsewhere available in such handy form. The book is divided into two parts. In the first, to which Prof. A. Albitreccia devoted his attention, the facts regarding the development of railways and motor services are set out country by country, in concise summaries. The second part, essentially the work of Dr. Paul Wohl, analyses in a series of chapters the principal aspects of the road and rail problem. In one chapter, on the legal bases and status of transport enterprises, the matters dealt with include licences, obligations, tariffs, timetables, and levies. Taxation forms the subject of another chapter, while others are concerned with measures taken by the railways to meet motor transport competition and with social and labour legislation. There are also three synoptic tables which enable a rapid survey to be made of the legal bases of railway and motor transport

organisation, of railway and motor taxation, and the measures taken by the railways to meet competition from the road.

Mechanical World Year Book, 1935. Manchester: Emmott & Co. Ltd., 31, King Street West. 6½ in. × 4½ in. 166 pp. Illustrated. Price 1s. 6d. net.—Always rather astonishing value for the small sum of one and sixpence, the new edition of this pocket book is as useful and as attractively presented as ever. New features have displaced material appearing in the 1934 edition, but it is stated that some of the sections will appear in alternate years, so that a proportion of those now missing will probably be in evidence again in 1936. Important new sections occupying many pages are those on compressors for air and other gases, and on the choice and utilisation of pumps. Minor additions comprise three pages dealing with rope drives, and a table giving the weights per foot of round and hexagon bar. Omitted from the present volume are the sections on bucket elevators, hydraulic plant, the steam engine, and welding, together with tables giving the Newall Standards and the dimensions of locking washers and terminals. In view of the proposal to run certain features in alternate years, we think it would be a good plan to indicate clearly which sections and tables are to be found in the previous year book. Simple omission from the index is apt to leave one in a state of doubt and incredulity unless one is fully conversant with the scheme being followed. Could not the index contain all the subjects covered, with an asterisk against references to a previous edition?

Hutchinson's Technical and Scientific Encyclopædia.—Part I of this work contains 48 pages and the last reference is "Aircraft Engines." About 40 parts will be issued in all at the rate of one a week. Well over 70 specialists have contributed to make the work authoritative and up to date, and illustrations are plentiful. The latter are mostly line drawings, but half-tone illustrations are also used. The field covered is much too large for explanations to be detailed, but bibliographical references are to be given in the concluding parts. We understand that this encyclopædia is the only one of its kind published during the last 25 years. If this is so, its predecessors must be very much behind the times and fit only for scrapping. The place for such an encyclopædia on a railway is in the experimental or research organisation where the investigators may be called upon to interest themselves in anything from artificial leather to the extermination of insect pests. With its help they should be able to turn at once to the right sources for existing infor-

mation, and so save time in the initial stages of their inquiry.

Great Western Docks, 1935.—The new edition of this annual reference book presents the latest information regarding "Britain's western gateways" in a convenient and informative manner. The essential details, and a brief history of each port dealt with, combine with full-page illustrations and large-scale folding maps to make the work indispensable to all concerned with the consignment of goods by sea. In addition to the statistical and directory pages, which include wharfage rates at all docks served by the company and a list of steamship services sailing therefrom, there are a number of useful general articles on important trades and transport facilities. As a record of Great Western enterprise, too, under which head the introduction of 20-ton goods wagons for the South Wales coal trade deserves special mention, the handbook earns a place among the standard reference books for traders.

Brasses.—The Copper Development Association, Thames House, Millbank, S.W.1, has issued under the above title the first of a series of booklets for engineers. Others which are projected will deal with such subjects as brass tubes, brass wire, nickel-silver, brass castings, and hot brass stampings. All will be printed on pages of a similar size, punched for binding in a single loose-leaf notebook. That under review is intended to act as a guide in the specification of brasses. As well as information on the properties of these metals and advice on selecting and working them, the composition and applications are given of representative copper-zinc alloys with summaries of the equivalent British Standard Specifications. This booklet is sent out in a distinctive brass-coloured binding cover, of a size convenient for the pocket. It is proposed to issue the series without charge to those interested in engineering design and the specification of metals.

My Car, Diary. London: Stermol Limited. 4½ in. × 3½ in. 110 pp. Price 1s. (1s. 2d. post free).—This handy little diary is useful to all users of motor vehicles for the pages in which to record running expenses and also for the hints which are given as to methods of tracing mechanical trouble. The latter section has undergone considerable revision, the information not only being brought up to date but also arranged in a form which it is believed will prove more convenient for reference. Another useful feature is the list of steep hills in Great Britain, giving their location and length and gradient.

Calendars and Diaries.—Since the publication of the list in our issue of January 4, we have received calendars or diaries from the following, to whom we tender our acknowledgments:—

British Timken Limited, Harland and Wolff Limited, Ransome & Marles Bearing Co. Ltd., H. J. Ryman Limited, Swiss Federal Railways.

* Brief editorial reference was made to this in our issue of December 1, 1933.

THE SCRAP HEAP

SOME FORMER RAILWAY PAPERS

The merging of *The Railway Engineer* with this journal increases the number of railway papers now incorporated with THE RAILWAY GAZETTE from seven to eight. The others are: *Transport*, *The Railway News*, *Railways Illustrated*, *The Railway Record*, *The Railway Official Gazette*, and *The Railway Times*, which had already absorbed the earliest railway paper of all, namely, *Herapath's Railway Journal* established in 1835. Thus, next May THE RAILWAY GAZETTE and its predecessors will have completed 100 years of continuous publication. The rapid increase in the number of British railways and particularly the railway mania of 1845 brought many other railway papers into the field. The following list of former railway periodicals (other than those now incorporated with THE RAILWAY GAZETTE) is taken from "The Times Handlist of Newspapers":—

Railway Advocate
Railway Argus
Railway Bell
Railway Chariot
Railway Chart
Railway Chronicle
Railway Courier
Railway Critic
Railway Director
Railway Engineer
Railway Examiner
Railway Express
Railway Herald

Railway Intelligence
Railway King
Railway Messenger
Railway Miscellany
Railway Notes
Railway Press
Railway Reformer
Railway Register
Railway Shareholder
Railway Signal
Railway Standard
Railway Telegraph
Railway World

Most of the journals had only a brief existence, but for a number of years there were three prominent and prosperous weekly journals associated with the British railway industry, viz., *The Railway News* (founded in 1864), *The Railway Times*, and *Herapath's Railway Journal*. These were largely financial papers and derived much of their revenue from official notices and reports of the railway companies' meetings, which were then held half yearly. But this was a constantly diminishing source of revenue consequent on the merging of the small lines into larger companies. In the 25 years between 1850 and 1875 more than 1,000 British railway companies had been reduced to 247. The process of amalgamation still continued, and eventually in 1923 of the remaining English, Scottish, and

Welsh railway companies 120 were reduced to the four group railways, leaving only the Metropolitan and London "Underground" apart from joint committees and some 30 lines of local interest. Anticipating that event, THE RAILWAY GAZETTE (which had been founded under the title of *Transport*, in 1892, and had already absorbed *The Railway Times*, and with it *Herapath's Railway Journal*), effected a merger with *The Railway News* at the end of 1918. It was realised that with the greatly changed conditions and reduction in the number of home railway systems a professional railway journal could be successful only by having the world for its sphere, and dealing with matters concerning management, engineering, and opera-



The striking first page in last Saturday's issue of "I.B." (*Illustrierter Beobachter*) of Munich. It bore a caption wishing luck to the Saarlanders voting for return to the Reich

THE Railway Engineer

A PRACTICAL JOURNAL FOR ALL CONCERNED IN THE DESIGN CONSTRUCTION AND MAINTENANCE OF
BRIDGES AND STRUCTURES LOCOMOTIVES SIGNALLING
PERMANENT WAY ROLLING STOCK MACHINE TOOLS
RAILWAY SPECIALITIES ELECTRIC TRACTION WORKS EQUIPMENT

Heading block of "The Railway Engineer" now amalgamated with "The Railway Gazette"

tion as affecting overseas, as well as home railways; the great railway systems of India, Africa, Argentina, Australia, and the Crown Colonies having achieved an importance equal to those of Great Britain. The first purely technical modern railway periodical to make its appearance was *The Railway Engineer* which was started in 1880, and the reasons for its amalgamation this week with THE RAILWAY GAZETTE are given in one of the editorial articles in this issue. *The Railway Magazine*, begun in 1897, appeals to the general public who take an interest in railways, and still continues to flourish.

Whilst on duty at the Bank station recently, two Germans handed me pre-war bus and Underground maps respectively, for exchange. They had retained possession of them throughout the war and following years and at the first opportunity had offered to return them for up-to-date maps.—S. M. A., in "Pennyfare."

TRAFFIC DELAYS DUE TO LOCUSTS

Locusts have infested South Africa, especially throughout the central areas of the Cape, where trains have been delayed up to two hours. In places the permanent way has been covered to a depth of four or six inches, and trains have been brought to a standstill; elsewhere continuous slipping has seriously delayed them. Government is pursuing an energetic campaign of destruction of the pest, which is gradually clearing the country of the insects.

The driver of the train from Sturry to Canterbury recently reported a body on the line, and a search party went out and found a woman, aged 69, at the side of the line, fast asleep, with her head on a sleeper. Although the wheels had passed within a foot of her head, the train had apparently failed to wake her. The woman, who had been staying at a Canterbury lodging house, gave no coherent explanation of her choice of a resting place, and was removed to Bridge Poor Law Institution, near Canterbury.

HERAPATH'S
RAILWAY AND COMMERCIAL
JOURNAL
ESTABLISHED IN 1835 AS THE
RAILWAY MAGAZINE.

STEAM NAVIGATION, MINES, BANKS, ASSURANCES, DOCKS, CANALS.

An early title block of "Herapath's Railway Journal"

OVERSEAS RAILWAY AFFAIRS

From our correspondents

IRISH FREE STATE

1934 Results

As compared with 1933 the three Free State lines show the following increases or decrease in traffic revenue returns:—

Great Southern ..	+ £149,754
Great Northern ..	+ £180,821
County Down ..	- £989

The improvement on the two former is accounted for partly by improved goods earnings and partly by the benefits secured from the co-ordination of road and rail transport under the recent Act.

Programme for 1935

It is hardly surprising therefore to learn that the Great Southern intend to take over 50 more bus services and spend £50,000 on building new buses. Five new locomotives and 12 steel coaches are to be built for the new mail train at Inchicore works, where economies are expected from the re-equipment of the erecting shop. The estimated expenditure on this new stock is £32,000. The scheme to close Broadstone terminus is still awaiting realisation. Three western line trains already start from Amiens Street station, but considerable expenditure will be necessary to complete the new Glasnevin junction and other connections to complete the direct communications in and around Dublin which will eventually be so beneficial.

Meanwhile reports indicate that a considerable degree of uncertainty still exists in the absorption of the road haulier firms by the railways and the former are vigorously fighting a rear-guard action against this policy step by step.

INDIA

The Viceroy on Communications

Speaking at the annual meeting of the Associated Chambers of Commerce in Calcutta on December 17, the Viceroy expressed his gratification at the ready co-operation of all local governments in the search for a progressive policy of road and rail development, which was so badly needed in a vast country like India. He hoped that even at its coming first meeting the Transport Advisory Council would be able to put forward schemes of development which would be of immediate value. Referring to recent demands for bringing all matters concerning communications under one portfolio, Lord Willingdon stated that in the Provinces the principal difficulty hitherto lay in the constitutional division of subjects between the Reserved

and Transferred sides. Under the new constitution that obstacle would disappear and local governments would consider the possibility of making such adjustments as were compatible with a proper distribution of work. At the Centre certain practical difficulties had been found which were engaging the attention of the Government.

Discussion of Railway Problems

The Associated Chambers of Commerce adopted several resolutions dealing with railway policy in relation to commerce and industry. One relating to railway goods tariffs was moved by Mr. Gavin Jones of the Upper India Chamber: "That in the opinion of this association there is immediate need for a close examination of railway goods tariffs so as to obtain closer co-ordination between the various railway systems, having regard to the needs of India as a whole, and primarily to ensure that the development of internal trade and export trade of the country are more advantageously served than at present. It is considered essential that, where the necessary data have been collected, non-official representatives of trade and commerce should be associated with Government in a full inquiry into the question." While admitting the existence of co-ordination between the railways on tariff matters, the mover suggested that the question should be viewed and based on certain broad principles affecting the whole of India rather than the needs of separate areas served by each system, and that the tariffs should be so adjusted as to facilitate and encourage internal trade, develop the manufacturing industries of the country, and lighten the burden of freight charges on goods for export to enable India to compete with foreign countries in the world markets. A resolution sponsored by the Bengal Chamber demanded the withdrawal of the 15 per cent. surcharge on coal freights.

Freight Rate Criticisms

A Karachi Chamber Resolution ran as follows: "That this Association views with the gravest concern the policy of the Railway Board who, by means of the powers conferred upon them by the Government for the fixing of railway rates, are, in an attempt to secure the maximum of carriage by rail, diverting established trades from their natural channels. It contends that in entrusting the Railway Board with such wide powers, the Government of India relied on these powers being exercised with the utmost discretion and with due regard to all interests affected; so that it was never contemplated that they would become

the means of depriving firms and individuals of their natural livelihood, or threaten, if carried further, to isolate ports from their recognised sources of supply." The mover mentioned that every one of the important reductions of freight on wheat that had been effected by railways other than the one serving the Karachi Port was specifically designed to divert the trade in wheat from Karachi and the sea route to the consuming centre, to an all-rail route. Mr. Reid-Kay of the Bengal Chamber, supporting the resolution, mentioned the protest of the Calcutta Port Commissioners about 18 months back against the decision of the Railway Board to despatch coal required by the South Indian Railway by the all-rail route instead of sending it by sea from Calcutta as had been done in the past. He deprecated cut-throat competition.

Another resolution advocating the co-ordination of rail, road and air transport services by the creation of a Ministry of Communications in the Central Government was passed.

SOUTH AFRICA

New Commission to Advise on Filling Railway Posts

A South African Railways and Harbours Service Commission has been established for the purpose of making recommendation for the filling of posts in the railway service, subject to regulations approved by the Governor-General, a summary of which is given below. The Commission will consist of three members appointed for a period of five years from January 1, 1935, by the Governor-General, one of whom shall be the Chairman of the Union Public Service Commission, who will be Chairman of the new Commission, while the other two members shall be appointed from officers in the railway service.

Increased Power for Minister and General Manager

Important alterations in the powers delegated to the Minister and to the General Manager in the filling of posts are among the amended regulations. Previously the Minister has had the power to make appointments and to increase emoluments in salaries up to £1,000 per annum. Under the new regulations he may appoint to casual, temporary or permanent employment and increase the emolument of an officer the maximum salary of whose appointment does not exceed £2,000. The General Manager previously had power to deal with appointments in salaries up to £600 per annum. Under the new regulations this power has been increased to allow him to deal with appointments up to a maximum salary of £1,500 per annum, subject to his being in agreement with the recommendations of the new Commission. In the event of disagreement, the matter will be referred to the

Minister. Appointments carrying salaries of over £2,000 per annum, rest upon the decision of the Governor-General.

It is provided that whenever it is necessary to appoint an officer to a post in the service in other than a casual capacity or to promote an officer to a higher post, the Commission shall make a recommendation as follows:—

(1) In the case of an appointment or promotion beyond the powers delegated in terms of Regulations No. 3 (2) (ii) to the General Manager for transmission with his recommendation to the Minister.

(2) In the case of an appointment or promotion within the powers delegated in terms of Regulations No. 3 (2) (ii) or 3 (2) (v) to the General Manager.

(3) In the case of an appointment or promotion within the powers delegated in terms of Regulations No. 3 (2) (iv) or 3 (2) (v) through the General Manager to the head of the department concerned.

The regulations referred to are the following: Regulation 3 (2) (ii) x, the Governor-General delegates to the General Manager or any officer acting for him power to appoint casual, temporary or permanent employment and to increase the emoluments of any officer the maximum salary of whose appointment does not exceed £1,500. Regulation 3 (2) (iii) gives power to the Assistant General Manager (Commercial), the Assistant General Manager (Technical), the Chief Traffic Manager, the Senior Staff Controller, a staff controller or any officer acting in their stead to appoint casual, temporary or permanent employment and to increase the emoluments of an officer the maximum salary of whose appointment does not exceed £750, including the value of free quarters. Regulations 3 (2) (iv) and 3 (2) (v) in a similar manner give power to various railway officers to make appointments and to increase emoluments of officers with salaries of varying amounts from £283 to £445 with free quarters.

Automatic Promotion

The provisions under which the Commission may recommend these appointments will not apply where promotion is automatic under existing regulations. Neither will they apply to the appointments or promotion of an officer to any position, the maximum salary of which does not exceed £600, including the value of free quarters, and which involves responsibility in respect of the use or safe working of the railways and harbours or any other transport services controlled by the Administration.

Creation of New Posts

Should a recommendation made by the Commission in respect of an appointment over which the General Manager has jurisdiction not be accepted by the General Manager, the recommendation shall be referred to the Minister, who, in consultation with the General Manager, shall decide. A similar procedure will apply when a head of department or other officer who has power is unable to accept the recommendation of the Commission in regard to appointments over which he

has been given jurisdiction. In such a case the papers will be forwarded to the General Manager and, if the latter cannot accept the Commission's recommendation, it will be referred to the Minister.

Whenever it is necessary to consider the creation of a new salaried post the maximum salary of which exceeds £600 per annum, including the value of free quarters, or to regrade any existing salaried post of such value, the General Manager shall make a recommendation to the Minister, with whom the decision will rest. The General Manager will have power to make the decision in the creation of new salaried posts valued at £600 per annum or less (including free quarters) or the regrading or conversion of any existing salaried post of such value.

Dismissal and De-Grading

The Minister is given the power to dismiss, to enforce the resignation of, or reduce the emoluments of an officer the maximum salary of whose appointment does not exceed £2,000. In a similar manner the General Manager and other officers who are mentioned above as having power to deal with appointments of various grades may dismiss, enforce the resignation of or reduce the emoluments of officers falling within those grades. The General Manager may impose in his discretion such limitations in respect of the exercise of the powers given to the officers subordinate to him as he may deem necessary.

BELGIUM

Kilometre Tickets

From January 1, 1935, books of coupons for first and second class kilometre tickets have been experimentally issued on the Belgian National Railways. Available at all stations, they are divided into fr. 10., fr. 5, fr. 2, and fr. 1 values. The books are issued to cover aggregate distances of 1,000, 5,000 or 10,000 km., and are available respectively for 1, 6 or 12 months. The respective reductions as compared with the ordinary tariff are 25, 35 and 50 per cent., and the fares are:—

Distance	First class	Second class
1,000 km.	fr. 470	fr. 320
5,000 km.	fr. 2,030	fr. 1,390
10,000 km.	fr. 3,120	fr. 2,140

Each book also contains vouchers for fr. 10, fr. 5, fr. 2, and fr. 1, in exchange for which the holders can obtain at all booking offices ordinary tickets issued at the same reduction available between any two stations on the Belgian National Railways. Each book is subject to a fr. 3 tax, payable in "railway stamps" in the same way as ordinary season and school tickets. The new tickets are issued in addition to these two kinds of period ticket.

On taking out a book of coupons, the recipient leaves a fr. 20 deposit to guarantee the return of the book the day after expiry. Should this not be done, the guarantee is forfeited. The

coupons are consecutively numbered, and must be torn off in their correct order. Fractions of francs are paid in ordinary money. If, at the end of a book, the coupons remaining do not amount to the full price of the ticket to be purchased, the difference may be paid up in money and the extra sum subjected to the same fare reduction.

ITALY

Naples Maritime Station

Work is now in hand upon the reconstruction of Naples Maritime station, which, when completed—probably about October next—will enable the largest liners to berth alongside the trains. As at the most modern Continental maritime stations elsewhere, passengers will land from the upper decks of vessels and pass across high-level gangways to the first floor of the station building, and thence down to the platforms direct.

THE FAR EAST

New Constructions in China

A new branch of the Chengting-Taiyuan Railway in central Shansi was opened for traffic on November 5. Four days earlier the 17-mile Hsuehchow-Luitung section of the Lung-Hai Railway in north-western Kiangsu was completed and traffic on it was inaugurated. A further section of the Tatung-Puchow Railway has also been brought into use.

Peiping-Tientsin Doubling

To improve the existing service, the Peiping-Liaoning Railway administration is planning to double the Peiping-Tientsin section of the line, a work estimated to cost \$500,000. As a result of this doubling, the time taken by the fastest trains between the two cities will it is hoped be reduced to about two hours, a saving of over an hour.

SWITZERLAND

New Works and Developments

As part of the general policy of expansion and remodelling in and around Berne, a new goods station has recently been opened at Weiermann, near the Fribourg line, together with approach lines and the usual facilities. At Geneva the Lausanne line has now been diverted and, instead of running through the park on embankment, it now traverses a cutting farther north, and about half a mile in length. This cutting is provided with a special curved concrete retaining wall to prevent the sound of passing trains from reaching the League of Nations' palace. The passenger station is now finished except for the railway mail service building, the adjacent ends of the platforms and the trackwork remodelling this will necessitate. The Neuchâtel-St. Blaise section of the Geneva-Bienne-Lucerne line has now been doubled.

IMPRESSIONS OF OVERSEAS TRANSPORT

VIII—Public transport in Toronto demonstrates the safety and efficiency to which the system can attain under progressive management

By A. W. ARTHURTON, formerly Secretary, British Railway Press Bureau

A FEW years ago the opinion was widely held that in a comparatively short space of time the only place that would see a street car (tram) would be a museum. To-day many large cities in Canada and the United States have street car systems still in existence. Some of them I found are efficient, clean and comfortable, others are not only uncomfortable but noisy, and a nuisance in the streets through which they run. One wonders how a country like the United States, so progressive and up to date in many ways, can retain in these days a system of transport which is frequently anything but modern. One would have expected to find at least trolleybuses in such modern cities. In the case of Toronto, however, the street car system is very efficient in service and modern in character, and justifies the confidence which the citizens have in their Transport Commission.

The story of public transport in and about Toronto is the story of railways and public transportation companies all over the world; of an industry awakened from ways that appeared good enough when it enjoyed a monopoly in serving the travelling public by the alarming competition of private motor vehicles, setting new standards in travel accommodation and diverting much revenue from the established transport services; of an industry awakened to the necessity of improved service at the lowest cost.

The Toronto Transportation Commission is a corporate body somewhat on the lines of the London Passenger Transport Board, created by an Act of the Ontario Legislature upon petition of the Corporation of the City of Toronto. The Commission consists of three members, residents and ratepayers of Toronto, who are appointed by the City Council for terms of three years. A notable provision of the Act of Incorporation requires the Commission "to fix such tolls and fares so that the revenue of the Commission shall be sufficient to make all transportation facilities under its control and management self-sustaining after providing for such maintenance, renewals, depreciation and debt charges as it shall think proper." By this provision the taxpayers of the city are protected against the possibility of having to pay in taxes any of the cost of operating or financing the transport system.

The city of Toronto has assigned in trust to the Commission "all the powers, rights, authorities and privileges of the Toronto Corporation as to the construction, maintenance, operation, and management of lines of motor buses, or of subways, or tubes or any other method of underground or overhead local transportation." The Commission has also the right to acquire control of motor coach routes radiating from Toronto.

Organisation of Services

Toronto's public transport industry is meeting the test of competition with attractive and modern services. It is meeting the further test imposed by world-wide economic stress with a stability fortified by sound financial policy, by efficient operating practice and by the adoption of modern equipment, with consequent economy.

The Commissioners and Management of the commission are apparently conscious of the great trust imposed in them and endeavour to merit the continued confidence of well-informed public opinion. Every year the commission sends to the City Council and publishes in the public

Press its annual report and balance sheet. At frequent intervals, also, the commission confers with the elected representatives of the public and publishes in the Press statements on the current developments of the public transport system. As an additional means of informing the public, the commission arranges a comprehensive exhibit each year at the Canadian National Exhibition in Toronto designed to demonstrate the progressive development of the public transport industry in its successful efforts to maintain its position as the supplier of this service.

Public transport in Toronto is operated solely to supply an indispensable service at the lowest possible cost without private profit. Where there is massed population there must be mass transport, and it is the experience of the largest cities in the world that increased population has emphasised and increased the need for efficient public transport services, and that the increase of private vehicles beyond a certain number has lessened the safety, usefulness and convenience of all private passenger vehicles. The controlling factor everywhere is street space, and no city can supply enough street space to accommodate sufficient private vehicles to serve the major portion of city travel, particularly during rush hours.

The Essentials of Public Transport

Accepting the conclusion that public transport services are and will be indispensable, the public is mainly interested in knowing whether the providers of those services are adopting methods suited to modern standards of safety, convenience and economy. The first essential quality of transport is safety. It does not matter how fast one can travel nor what comfort and conveniences are provided, nor how low the cost is—the passenger's first consideration is whether he will arrive at his destination alive and uninjured. The record of the Toronto public transport services is unsullied so far as fatal injuries are concerned. In 11 years their vehicles have run more than 320,000,000 miles and carried 3,000,000,000 passengers, but not one passenger has been fatally injured. Such a record proves that the public transport services of Toronto conform to modern standards of efficiency in the matter of safety. Convenience in transport is the sum of several features—availability, regularity, reliability, comfort and speed, in all of which the Toronto Transport Commission meets public requirements.

Due to the number of motor vehicles now using and standing in the streets, many cities have found that congestion hinders the proper movement of the traffic. Although there should be no obligation upon ratepayers in general to provide valuable street space free of charge for the owners of motor vehicles to park in for long periods, millions of pounds have been spent by cities on widening and similar works designed to relieve traffic pressure. In many cases part of the expense has been charged against the public transport services in those streets, the amount being derived from fares. Elsewhere, when public transport receipts do not equal working costs, instead of charging the services with expenditure incurred chiefly for the benefit of their competitors, the balance is collected in taxes from all ratepayers. Toronto's public transportation services, however, claim to be self-supporting, and no burden on the community.

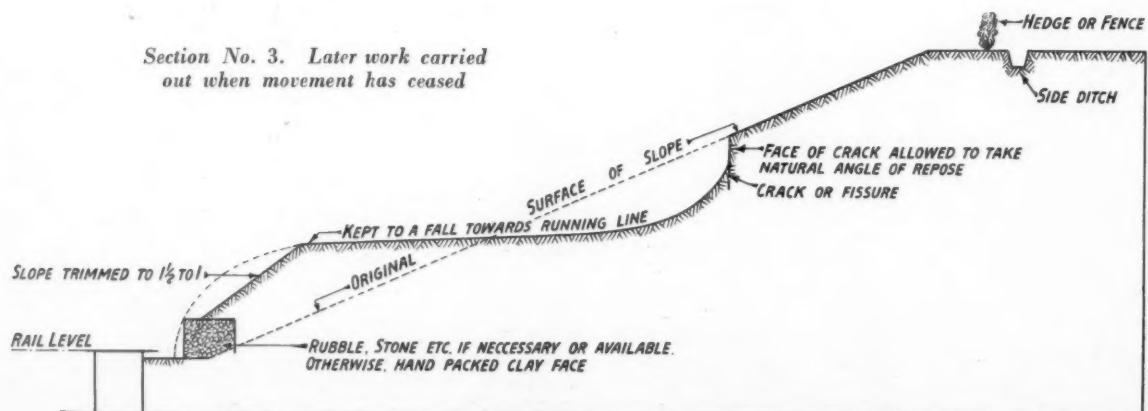
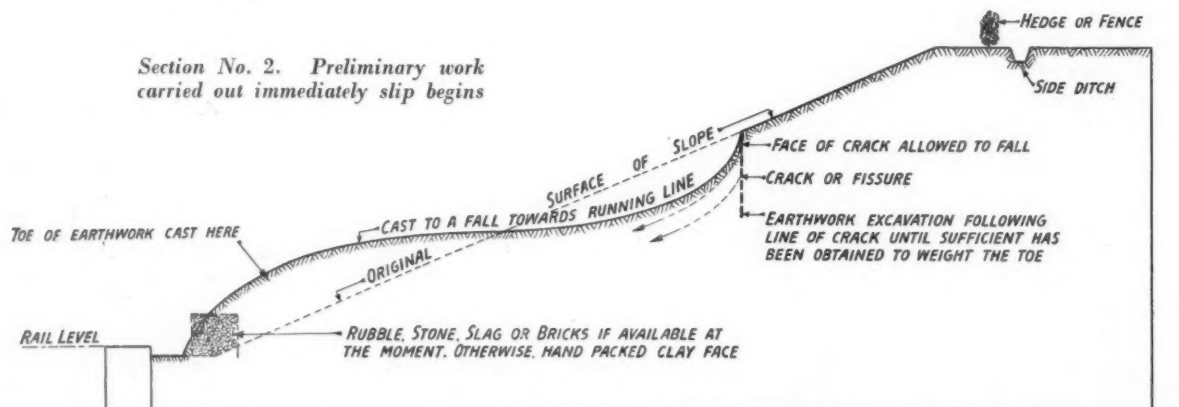
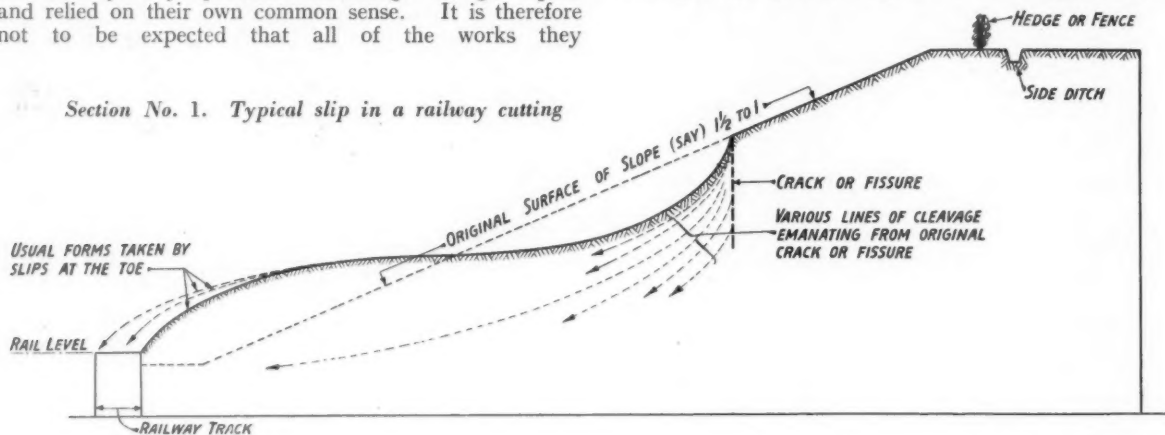
RAILWAY MAINTENANCE PROBLEMS, 1—EARTHWORKS

By Lt.-Col. H. A. HULL, M.Inst.C.E., District Engineer, Northampton, L.N.W.R. & L.M.S.R., 1918-33

Notwithstanding all the knowledge now available in print, some of the most essential and elementary facts are often ignored. There are always pioneers at work, on whose heels follow those with ingenious minds to record their results as formulæ for the future guidance of the unimaginative or timid.

THE early railway pioneers, who at that time were not recognised technically as engineers, had hardly any previous knowledge to go upon, and relied on their own common sense. It is therefore not to be expected that all of the works they

conceived and carried out would stand the test of time, for they had not behind them the experience of maintenance. The present writer, in his early days, was a New Works Engineer, and designed and carried out many railway works. Later in life he had the responsibility, as a District Engineer in the Midlands, of maintaining various works which had been carried out in the past. Experience soon showed that a considerable amount of the previous practice might with advantage be revised,



particularly concerning earthworks, where forces occur which do not seem to have been generally recognised.

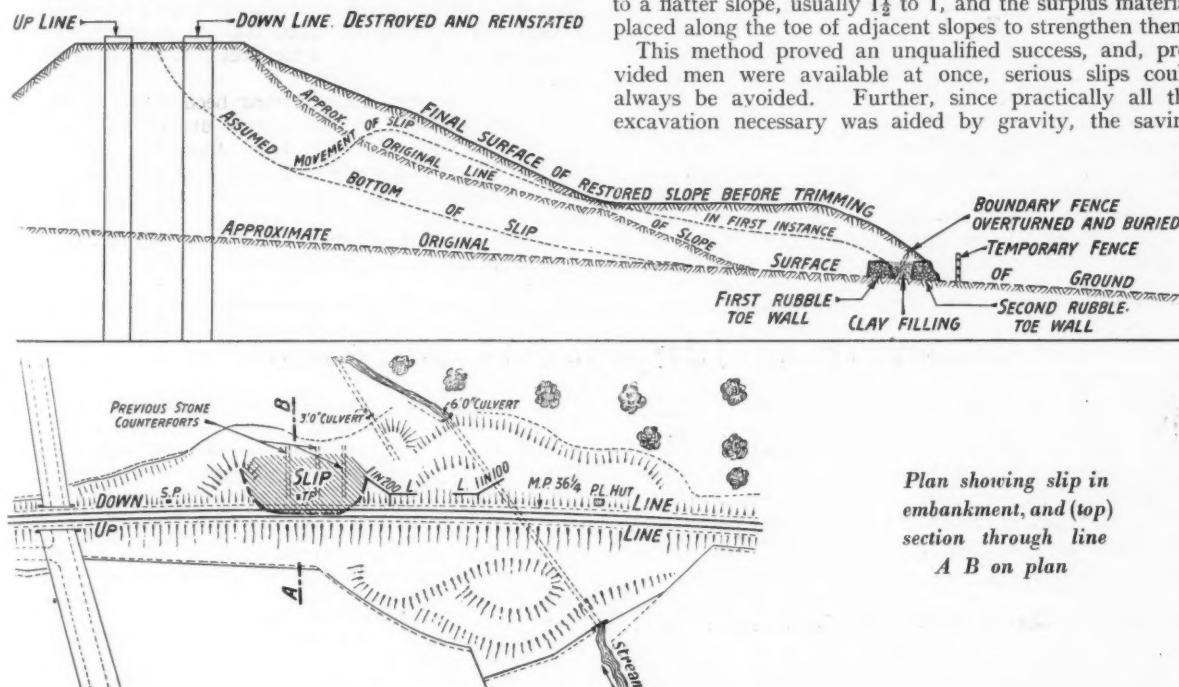
Large sums of money were spent annually on slips in this district, the geological formation of which made this source of trouble a frequent and serious one. It soon became apparent that vibration and a wedge action, apart from, or in conjunction with, water and snow, were the main contributory causes of slips.

The extent to which vibration caused by fast running traffic can be felt under different weather conditions is well illustrated by the case of a house a quarter of a mile away from a shallow cutting near Atherstone, on the Trent Valley line. In wet weather the passing of expresses on the railway caused the house to shake, whereas after a dry spell, when there were cracks in the ground, no vibration could be felt. Slips of earth where there is no

In cuttings, the method of weighting the toe of a slip (illustrated in Fig. 1) was, first to clear it in short lengths from the cess, then to fill these lengths in with hand-packed stone if available, or the firmest lumps of earth cast down from the height, and finally to tip the clay, with as steep a slope as would stand, on to this improvised toe wall until the weight was sufficient to stop the movement. Many slips occurred on the sites of previous slips which had been treated with stone counterforts, and the latter came in useful to provide suitable stone for the new toe wall.

The material above the crack on which the earth had slipped was left to take care of itself, usually weathering by degrees and falling on to the bench formed by the weighted toe. In the following summer, after the mass had consolidated, the earthwork at the toe was dressed to a flatter slope, usually $1\frac{1}{2}$ to 1, and the surplus material placed along the toe of adjacent slopes to strengthen them.

This method proved an unqualified success, and, provided men were available at once, serious slips could always be avoided. Further, since practically all the excavation necessary was aided by gravity, the saving



Plan showing slip in embankment, and (top) section through line A B on plan

vibration are very rare, whereas railway slopes are notoriously subject to them.

The writer's theory of the main cause of slips in clay cuttings is that rain water becomes trapped in the cracks which open out in dry weather and gradually percolates downward forming a cleavage surface perhaps not more than an inch thick. The downward percolation is encouraged not only by gravity but by a wedge action set up by the closing of the cracks during the wet winter months, and by the modicum of sand of which the Midland clays are not free.

The line of cleavage generally takes the form of an epicycloidal curve from the original crack, which occurs most often about a third of the way from the top of the slope, down to the toe. This shape is probably caused by the forces already specified, coupled with the atmospheric attraction acting upon the face of the slope tending always to draw the water to the surface.

The mass of earth being thinnest at the toe and consequently lightest there, equilibrium is destroyed, and the vibration of passing traffic starts the severed mass moving. Having formed this theory, the writer found that by weighting the toe as soon as symptoms of a slip appeared, the initial movement could be stopped at once.

in cost was enormous. It was rare to have to bring other material to the site, or to have to buy any land. Where drains existed at the foot of the slope, they were either left undisturbed or diverted nearer the rail.

In rare cases of circumscribed space where the method outlined could not be adopted, and counterforts had to be built, the principle of having the biggest mass at the foot was adhered to, and the counterforts made thicker at the base than at the top. Of course more than one of these inverted-wedge counterforts would always be built, so as to give the necessary downward wedging action to the earth between them.

An effective form of weighted toe wall may be constructed of pre-cast concrete cribbing, such as is very popular in North America, filled in with earth or other suitable material. For dealing with slips, however, this is no more effective and is generally more expensive than the method outlined above.

Ditches, without a fall steep enough to empty themselves quickly after rain at the top of cuttings, are liable to cause slips, in the same way as sun-cracks in which water may be entrapped. Such ditches should be eliminated and the water diverted or brought over the surface of the cutting.

The writer's experience of trying out various alleged

remedies for or preventives of slips, such as planting special grass or trees or burning the clay, have convinced him that the only generally effective method is the prevention of water percolating beneath the surface of slopes, and also by weighting the toes.

The cause of slips in embankments does not seem to be so closely associated with vibration or cracks near the top of the slope, although of course these may be the final factor in starting movement coupled with water which has percolated into the bank during wet weather.

Banks on sidelong ground, or with a marshy bottom are the most liable to slip if the toe is not specially weighted. On the other hand, if the toe is heavy enough, a bank may be thoroughly waterlogged and yet remain stable. The writer had experience of such an embankment through which it was proposed to tunnel at ground level to lay a pipe. So much water poured into the beading that it was eventually found necessary to cut a trench downward from the top, timbering the sides.

That burnt clay toes may be useless to prevent slips was illustrated by the case of a line built in the Midlands some 40 years ago through a clay formation. Burnt clay toes, sloped on the outside to conform with the final slope of the bank, were formed before tipping began. These toes were about six or eight feet wide and the same height, but they proved quite ineffectual to prevent slips, the clay in the bank simply sliding over them.

A slip typical of many others was that of an embank-

ment 70 ft. high through sidelong marshy ground. For many years the permanent way men had been constantly repairing the road until one day a slip suddenly occurred, dropping 10 ft. The line of cleavage was halfway between the up and down roads, and the latter was left suspended over a distance of more than 300 ft. The toe was pushed out and soon overturned the boundary fence.

The remedial measures are indicated on page 93. A random rubble toe wall was built at the edge of the advancing mass which, however, soon mounted it, so that a second similar wall had to be built about six feet outside the first one. The intervening space was filled with the heaviest material available, mostly stone from old counterforts that had been built with the object of stopping a former slip. The two toe walls were not more than a few feet high and each was about six feet wide in the base. Together with the heavy intermediate filling, they effectively stopped the slip, the upper portion of which was duly filled in. There has been no sign of further movement since.

The methods outlined above having become familiar to the permanent way men, effective steps are always taken by them immediately upon any sign of movement being detected, with the result that slips with their accompaniment of traffic delays and expense have been virtually eliminated.

[We hope to publish the next article of this series in our issue dated February 15.]

ASPECTS OF TRANSPORT IN THE EMPIRE

WE publish herewith abstracts of papers on "Railway Development in the Colonies" by Brig.-Gen. F. D. Hammond, C.B.E., and on "Ports, Bridges and Railways in the East" by Mr. J. S. Tritton, which were read to the Royal Empire Society on January 15. A third paper of transport interest was that presented by Mr. Ralph Freeman on "The Sydney Bridge," a work which was fully described in our issue of March 18, 1932.

General Hammond on Railway Development in the Colonies

The first Colony which appears to have built a railway was British Guiana. The first railway in the world operated for general purposes was opened in September, 1825, and already in 1837 the enterprising colonists of British Guiana were trying to form a company locally to build and operate a railway from Georgetown to the Mahaica River. The population at that time consisted of about 3,500 whites, 7,500 free blacks and 87,000 slaves. The first prospectus was issued in May, 1837; it refers to the approaching unconditional emancipation of slaves and urges "that only by the substitution of machinery to the greatest possible extent can the planter, and particularly the sugar grower of Demerary, hope to compensate the probable deficiency of human labour, and to combat the foreign producer in the markets of Great Britain."

Unfortunately, the project appears to have got stuck there. It was not until 1847, ten years later, that construction actually started. Further difficulties in connection with finance and labour then cropped up, and it was not until November, 1848, that the first section of 6 miles was opened. Nevertheless, despite these delays, this small Colony has the proud boast that theirs was the first railway ever constructed in the whole continent of South America. The railway was ultimately purchased by the Colony in 1922.

So far as I can find, the next Colony to start a railway was Ceylon. A company was formed in 1845; then followed many years of bargaining and discussion between the company and the Government, until finally a contract was made between the two under which the Government gave certain

guarantees of interest, and the first sod was cut in 1858. The troubles did not end there because, when work really started, it was found that the data on which the estimates were framed were quite inadequate, and the cost would be much higher than originally contemplated. Eventually in 1861 the Government bought out the company and gave the construction out to contract to a Mr. Faviell. He lost money on it, but the Government made him a present of £58,302 over and above the contract figure, though how this compared with his loss I have been unable to find out.

We have so far encountered only railways built by private enterprise, but when we turn to countries like Malaya, or East or West Africa, where railways were introduced much later, we find the governments building and owning the railways from the start. In Malaya the first line was built by the government of Perak, and was opened in 1885.

In British West Africa the first railway built was in Sierra Leone. This was first surveyed in 1893. It was begun in 1896, and finished at the end of 1898. It was delayed by the Hut Tax Revolt in the Colony in 1898 and the succeeding punitive expedition. This line is of 2 ft. 6 in. gauge, as opposed to the usual African 3 ft. 6 in. That this was a mistake is now generally recognised, and the blame for it is usually attributed to the consulting engineers. A perusal of the correspondence shows this to be hardly fair, because, although it is true that the consulting engineers might have protested more emphatically, the main delinquent was the Colony itself, which insisted that the railway must be of the cheapest possible kind.

In the Gold Coast the first survey was made in 1894 by Capt. Leng; his proposed railway started from Saltpond and went to Eusa on the Burim river, about 60 miles long. In the estimate of the cost drawn up by the consulting engineers on Capt. Leng's report, mention is made of the traffic possibilities of palm oil, rubber and timber, but none of gold, and yet gold was the reason only three years later for building the first line commenced in the Gold Coast, namely that from Sekondi to Tarkwa.

In Lagos the first survey for a railway was begun in 1895. Work was started in 1896 and the line opened to Abeokuta in 1899. This was rather remarkable, as it was reported by Sir George Denton that as late as 1888 it was not safe

to go far from the town of Lagos. This, like the Gold Coast line, was of 3 ft. 6 in. gauge.

Many hard words have been spoken about the early West African railways; in particular, that the best route was not always chosen and that curvature was excessive, but I think that, considering the difficulties, the results were by no means bad. Take the Gold Coast for example; the whole of the first stretch passes through dense tropical forest, trees 60 ft. to 100 ft. high, matted together from top to toe with luxuriant vegetation. The average sight that can be got when surveying is 60 yards, and is seldom more than 100. Into the bargain the surveyors were being urged on by the clamour of the Government and the gold mining companies.

These early African railways were all built by the method of direct administration under consulting engineers. When, however, Sir Percy Girouard was appointed High Commissioner for Northern Nigeria in 1907, a new method was adopted. Sir Percy had made his name on railways and railway construction, and one of the chief objects of his appointment was to push a railway through from Baro on the Niger to Kano. He was fortunate to find there as Director of Public Works Mr. (now Sir John) Eaglesome, who had been brought up in the fine school of Indian railway engineering. A separate department was formed under Mr. Eaglesome as Director to build the line, and it was backed by all the resources and the enthusiasm of a young Colony, led by a Governor to whom everyone was devoted.

If we turn now to East Africa, the original Uganda Railway was built under a different regime. In those days British East Africa was under the Foreign Office and not the Colonial Office. The object here again was administrative rather than economic, but the funds for construction were found, not as on the West Coast by the Governments concerned, but by the Home Government. The construction in this case was under a Special Committee with Sir Alexander Rendel as Chairman. Construction began in 1895. Metre gauge was chosen owing to the cheapness with which plant and materials could be got from India.

When we turn to the Rhodesias and Bechuanaland, we find an entirely different regime. The British South Africa Company, under its charter, had the right to construct railways, and it formed two companies, the Bechuanaland Railway Company, now the Rhodesia Railways Limited, and the Mashonaland Railway Company to carry out its obligations. At about the same time, viz., 1895, the Chartered Company, to give it its usual title, was instrumental in forming the Beira and Beira Junction Railway Companies, to build a railway up to Rhodesia from the port of Beira through Portuguese East Africa. The railway from Vryburg to Bulawayo was built to the standard South African gauge of 3 ft. 6 in., but the line from Beira to the Rhodesian frontier was actually completed to a gauge of 2 ft., though later converted to 3 ft. 6 in.

It must be remembered that the British Colonies in Africa are sparsely populated. This is a fact which is not always appreciated. There are notable exceptions, of course, such as Uganda and the country round Kano in Nigeria, but all these areas have already had railways built to them. Nor are we likely to see any more lines built for administrative reasons, particularly in these days of motor transport. Motor transport is also reducing the need for branch lines. And so, however reluctant we may be, we are driven to the conclusion that, apart from mines, only very few railways are likely to be built in the British African Colonies until there is a marked increase in the population and that means for many years to come.

Mr. J. S. Tritton on Ports, Bridges and Railways in the East

Each subject comprised in the title of this paper has formed the life study of many eminent engineers. To attempt to review the life's work of these great men during the last 100 years in 20 minutes is impossible, and a few typical examples have therefore been selected from the more important works with which the writer's firm has been connected as consulting engineers. These are a tribute to two great engineers—Sir Frederick Palmer and Sir Alexander Rendel—whose work comes fitly within the category of this

evening's theme, and who have been jointly connected with the development of the ports, bridges and railways of India for three-quarters of a century.

The number of major ports in India compared with the extent of its coastline is surprisingly small. This is a result of the configuration of the country. There is a line of mountains—the Ghats—down the western side of India for nearly 1,000 miles, which practically cuts off 250 miles of coastline from the interior. Only three roadways cross the barrier in that part of the country. On the eastern side of India there are 100,000 square miles of country, with a coastline of 600 miles, so sparsely populated that there is hardly any need for a port there. The new port of Vizagapatam, however, which has just been completed on this part of the coast, is an attempt to develop the area.

Haifa harbour in Palestine may be taken as representing the most modern aspects of port construction. Up to 1922 all shipping for Palestine had to anchor off the coast at Jaffa or Haifa and goods had to be taken ashore in lighters. But the weather made this procedure impossible for about 60 days in the year.

A second reason for the construction of the harbour was the provision which Great Britain had to make for Jewish immigration under the League of Nations mandate. In this way the population has been increased by about 120,000 in the last 10 years, and 180,000 acres of land have been brought under cultivation. Thirdly, the new pipeline from the Iraq oil-fields to the Palestine coast necessitated a port there, and a fourth factor was the possible construction of the Haifa-Baghdad Railway, which would improve existing transport to the sea and call for a better outlet for the goods so carried.

As to bridge construction, there is a wonderful example of pioneer work in the existence of 95' screw pile bridges, with a total length of 6 miles, in the 244 miles between Bombay and Baroda. These had to be built ahead of railroad, and made up of sections weighing only 30 cwt., so that they could be conveyed in native boats. The modern system of mass production by steel jigs in bridge builders' yards has the obvious advantage of standardisation and the simplification of work by ensuring the interchangeability of parts. The method of floating complete spans into position on pontoons, examples of which type of construction are the Harding bridge over the Ganges, the Willingdon bridge at Calcutta and the Ava bridge over the Irrawaddy, entails complicated but vital calculations. The combined deflection of the pontoons and girders carrying a span of 1,400 tons is a specimen of what must be ascertained to enable the timber packing between the two to be computed exactly.

The outstanding feature exhibited in railway development over the past 45 years is that of standardisation, originally designed to facilitate the interchange of locomotives for military purposes and later to reduce costs of construction by mass production methods. In India, 26 new types have been designed in conjunction with locomotive builders under the instructions of the Railway Board. These types fulfil all requirements for the whole of India, and are specially designed to make larger use of the local coal available. Standardisation has also extended to carriage and wagon rolling stock, bridgework and track equipment. To assist in the collection of data regarding locomotive performance, a dynamometer car has been constructed for the Railway Board in which information is recorded simultaneously by 16 stylos. The car cost £30,000, and took three years to produce. Electric traction is developing rapidly, with 2,200 h.p. locomotives for passenger and 2,600 h.p. locomotives for goods service. The Deccan Queen, the electrically hauled luxury express from Bombay to Poona, has reduced the time of transit between these cities from 5 hr. to 2 hr. 50 min.

India today is in the full glare of the political limelight. The engineer is no politician, but he may be given credit for one of the greatest unifying factors in the Empire—transport, and all that it implies. His transport and communication serve all, of high or low estate, without distinction of class, caste or creed. He plans ahead, but he realises that his work, like our great Empire itself, will survive just as long as it is of service to humanity.

OPTICAL LINING-UP OF LOCOMOTIVES

Application of the principle at Swindon works of the Great Western Railway

AMONG other interesting developments recently made at the Swindon locomotive works of the Great Western Railway is the adoption of optical lining-up methods for locomotive frames. Use is made of the Zeiss apparatus modified to suit the particular requirements at Swindon. This method provides an accurate means of measurement of the alignment of frames and cylinders, and of the distances from the cylinder to the driving horn centres, and between the driving and the other horn centres.

The basis of the apparatus is a telescope mounted within a tube, arranged so that it can be pivoted in vertical or horizontal planes by two dials. When these dials are both set at zero, the telescope is in exact central alignment with its external tube—which is set with a self-centring spider—in the front bell-mouth of one cylinder, and by an adaptor in the stuffing box at the back of the cylinder. A spirit level ensures that the vertical and horizontal axes are correct, and a measuring surface set level with the front cylinder face by a straight edge provides zero for distance. The overall width across each pair of horns is measured by a vernier, after which a sighting scale is clamped to each horn in turn and the scale read through the telescope. The sighting scale is similar to a surveyor's staff and the reading gives the distance of the cylinder axis to the outside edge of the horn. This distance plus half the width over that pair of horns gives the distance to the theoretical centre line of the engine. If this sum does not amount to the same total at each horn, the cylinder axis is not parallel with the centre line of the line. A certain tolerance can be allowed here and the telescope pivoted horizontally until its centre is parallel with the engine centre line, but if the correction would be beyond the allowed limit, it may be necessary to cut down some stiffeners or cross stays and reset the frames.

Assuming that the telescope is set parallel with the theoretical centre line of the engine, the sighting scale is removed and a collimator, clamped to a tube in such a way that it is dead at right angles to the axis of the tube, is supported at the driving horn, the tube being right across the frame between both driving horns. The tube is held in a stand, the top of which can be moved vertically or horizontally to or from the cylinder, and through an angle horizontally. The collimator is an optical apparatus carrying two sets of cross scales illuminated by an electric lamp, and has the property of accepting at zero on its infinite scale only rays parallel

with the telescope. If on sighting from the telescope the telescope cross lines cut the horizontal and vertical lines of the infinite scale of the collimator at zero, then the telescope and the collimator are truly parallel, although not necessarily in the same plane. How much they are out of plane can be read by focusing the telescope on the finite scale of the collimator and reading the graduations. The horizontal, vertical and angular adjustments provided for in the collimator stand allow the latter to be brought easily into alignment with the telescope. As the collimator is now parallel with the telescope and is fixed accurately at right angles to the collimator cross tube, it follows that the cross tube is now between the driving horns at right angles to the cylinder axis.

A dial indicator is used to obtain the distance of each horn cheek from the collimator cross tube, and the latter is traversed longitudinally until it is central between the driving horns. A length gauge with dial indicator from locating points on the telescope tube and the collimator tube gives a direct reading of the distance from the cylinder face to the centre of the driving horn, and from the collimator cross tube a locating stud on each frame is set at a definite distance from the horn centre. Length gauges enable further locating studs to be set at each of the other horns, *i.e.*, "leading," "intermediate" and "trailing," and from these similar measurements can be made to each of the corresponding horn cheeks. By means of the accurate rods and the dial indicator, all these measurements can easily be read to within a thousandth of an inch, although the total length between the leading and trailing horn centres may be as much as 20 ft.

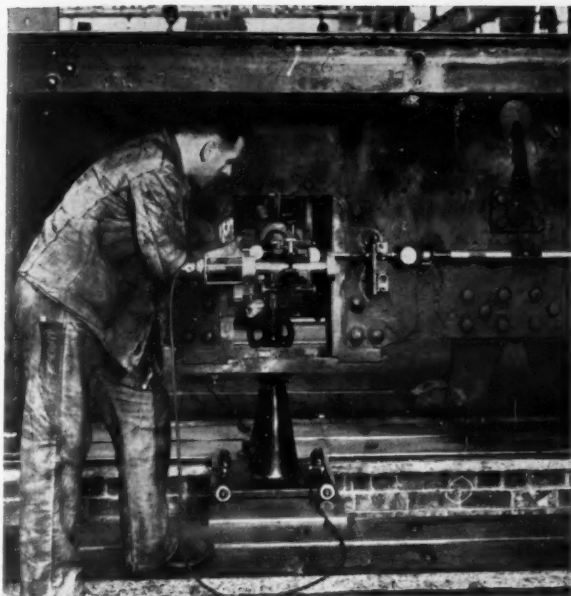
Thus a very accurate survey of the salient points of a locomotive frame can be made expeditiously, and from this decisions taken as to the amount of corrections to be made.

Experience on the German State Railways with this apparatus has, it is said, shown that the total time of lining up a locomotive frame by this method amounts to only a quarter or a third of that previously required, and that the longer period between repairs is a result of superior accuracy in carrying out the operations, while in respect of manipulation, little more in the way of skill and attention is required than in the case of the ordinary methods of lining up. We are indebted to Mr. C. B. Collett, O.B.E., Chief Mechanical Engineer, Great Western Railway, for the particulars of the Swindon apparatus and the photographs used for illustrating it.

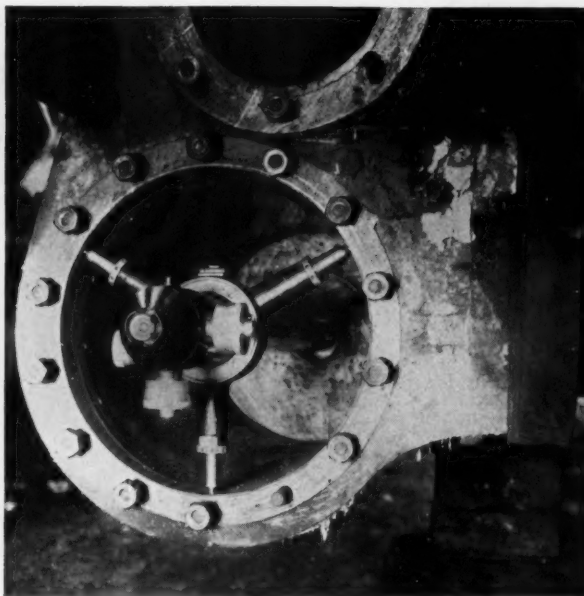
The First Railway in Schleswig

Eighty years ago last year saw the opening of the first railway line in Schleswig-Holstein. The provinces were then united to the Crown of Denmark, while Schleswig itself was not a part of the North German Confederation. The Danish government was not much interested in establishing communication with German territory and sought to make a line across Schleswig, to the north of the Eider, from Flensburg to Husum and onwards to Tönning. The first suggestions for such a line appear to have been made in 1830, and the route was surveyed at State expense ten years later, but it was not found possible to raise the capital. From an article by Herr Overmann in *Die*

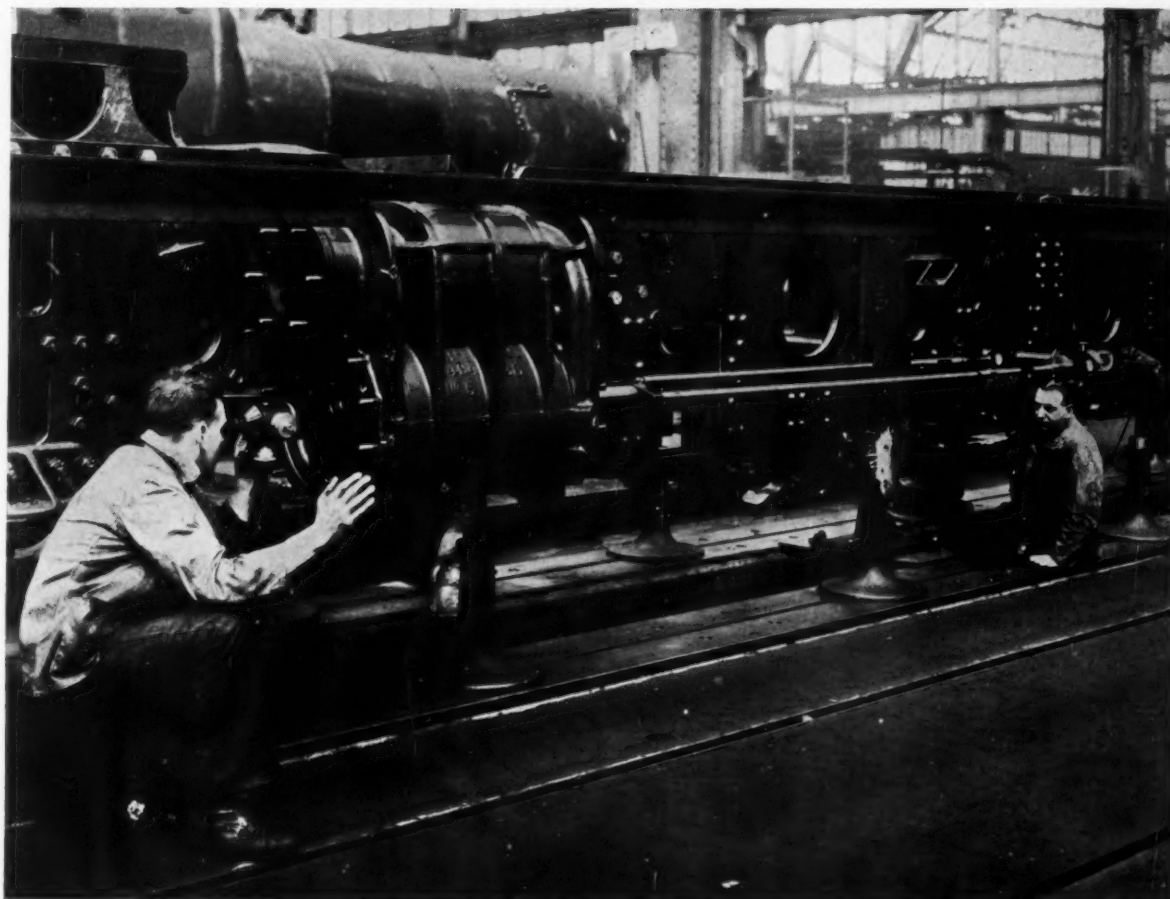
Reichsbahn we learn the interesting fact that it was the well-known early British railway contractors, Peto, Brassey and Betts, who undertook to make the line, by which time the Altona-Kiel Railway had constructed a branch almost to the Schleswig border. The firm received a concession in 1852, and the railway was opened in 1854. The same firm was later concerned with other lines in the two provinces until 1864, when dynastic disputes culminated in the war over the Schleswig-Holstein question, and the separation from Denmark. Shortly afterwards Peto, Brassey and Betts disposed of their interests to German companies.



Collimator and cross-tube in position between the driving horns



The telescope centred in front end of locomotive cylinder



The Zeiss method of lining up locomotives in use at Swindon works, G.W.R.

PROGRESSIVE REPAIR OF LOCOMOTIVE AXLEBOXES—I

*Details of the new system installed at the
Horwich locomotive works of the L.M.S.R.*

A LARGE percentage of the work performed in railway shops consists of repairs to locomotives and rolling stock. Much of it is repetitional, calling for systemised methods in order to secure expeditious handling of the components and economy in time and labour. The introduction and development of the line or belt system of repairs in locomotive erection has also necessitated a speeding up and reorganisation of methods of dealing with

scheme is used. The inspector marks the axleboxes and its details with the following colours: red indicates that the axlebox is scrap, yellow that it requires re-conditioning, whilst green indicates that the axlebox is ready for immediate use. This scheme conveys immediately to the operator at the initial stage of the line repair system all the information he requires concerning the repairs to be carried out. The layout of the plant in conjunction with

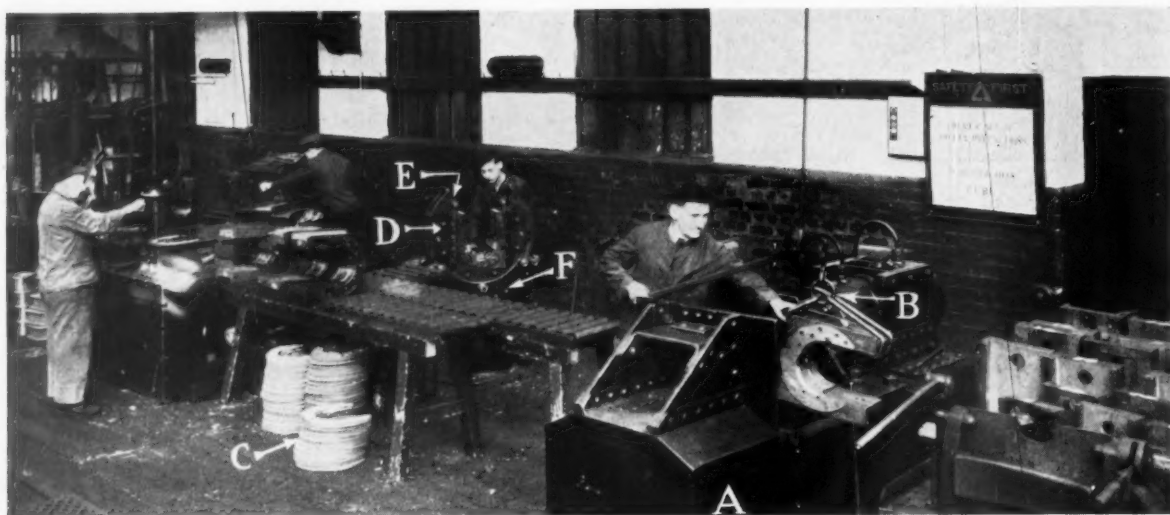


Fig. 1—The first repair stage; starting point of the new system

the repair of the various component parts. These have been given special consideration at the Horwich locomotive workshops of the London Midland & Scottish Railway, and the progressive repairs in operation there for dealing with axleboxes form an interesting feature of the work.

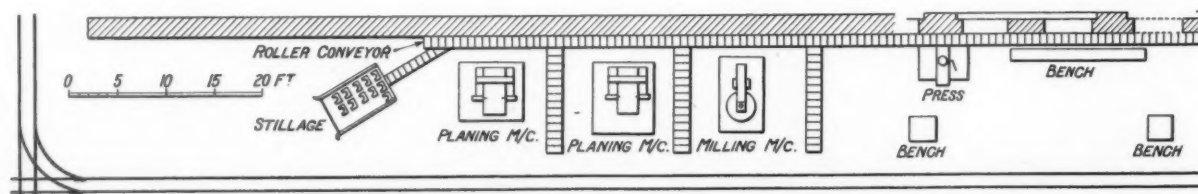
By the courtesy of Mr. W. A. Stanier, the company's Chief Mechanical Engineer, we were able recently to follow the working of this system on the spot. The smoothness and regularity with which it operates and the results obtained are decidedly impressive and the following description, together with the drawings and other illustrations, will serve to make clear to our readers the details of the system.

After the cleaning operation is completed the axleboxes are inspected for any defects such as flaws, distortion or wear, and in conjunction with this inspection a colour

special work fixtures and metalling chills is so arranged that all the various types of axleboxes dealt with, from the smallest to the largest, are treated progressively.

The First Repair Stage

The boxes being now ready for the first stage of repair are lifted from a stillage to a horizontal press, shown in Fig. 1 at A, by the aid of the special lever lifting arrangement and lifting links B which are seen in actual operation. They are then lowered to the correct position on the press for pressing out the old gunmetal inserts. The three inserts are pressed out simultaneously by suitable adaptors carried on the end of the ram. The marking of the boxes in accordance with the colour scheme indicates to the fitter whether new liner plates are required or not. If new liners are found to be necessary the box



General plan of axlebox repair layout

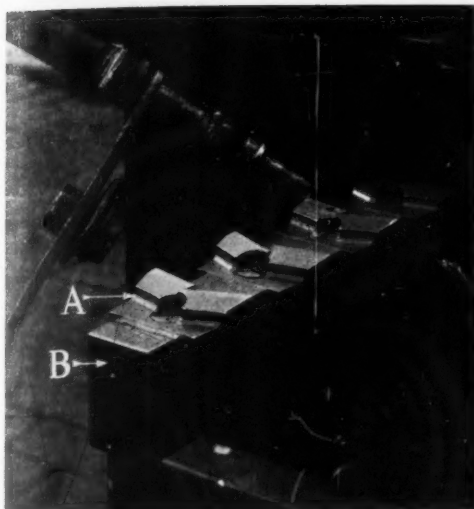


Fig. 2—Broaching operation on Lapointe machine

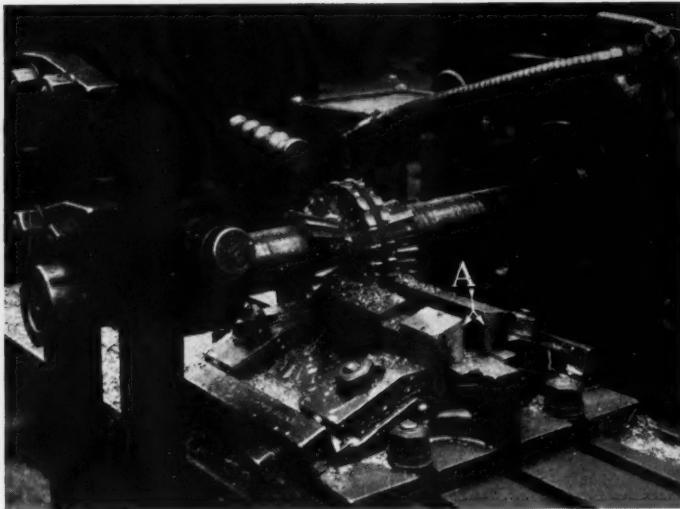


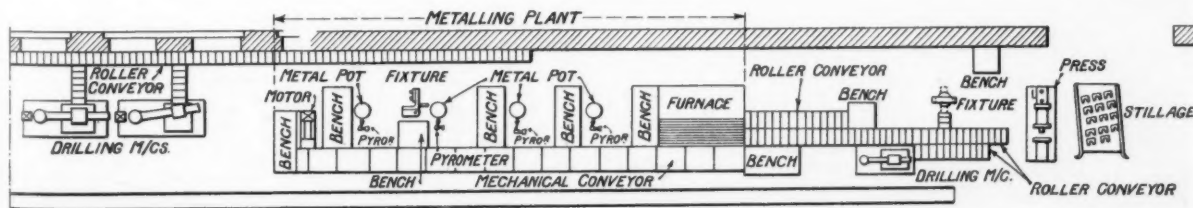
Fig. 3—Special milling fixture on Archdale machine

is placed on a roller conveyor, shown in Fig. 1, which feeds directly to a radial arm drill. The operation of taking off the old plates is carried out on this machine, and a special tool fixed in the drill spindle is used for withdrawing the countersunk copper set-screws which secure the liner. After the old liner is taken off a new one is fixed in position and new screws are screwed tightly in position by a special conical tool fixed in the drill spindle. The set screws are turned with an extension at the head end of $\frac{1}{2}$ in. which is recessed to the core diameter of the screw. The conical tool grips the extension and when the screws are driven in as tight as possible the extension piece automatically breaks off level with the head of the countersunk screw. These liners are previously drilled to a jig and countersunk in batches as shown at C, Fig. 1, according to the various types required. Each jig is used for drilling the respective types of boxes when new, thus ensuring interchangeability between the liners and the box. After this operation the box is moved on the roller conveyor from the drilling machine table to a special universal work fixture for the operation of fitting new gunmetal inserts. This fixture, which is shown in Fig. 1, at D, is placed adjacent to the conveyor so that the boxes can be inserted direct from the roller conveyor to the fixture.

The latter consists of a pedestal on which is mounted a U-shaped head designed to receive the various widths of axleboxes by an adjustable sliding bracket E. The head itself can be freely revolved a complete circle on the pedestal and fixed in the positions required by spring-loaded dowel pins. The head can also be revolved in the opposite direction on the cradle F, in which are fitted steel rollers to enable the head to be freely rotated. In

effect this represents a universal fixture in which all the various positions required can be obtained with a minimum of effort and without actually handling the axlebox in the process. The dovetail slots in all new axleboxes are broached on a Lapointe broaching machine in conjunction with a special fixture in which the relative positions of the cored slots are quickly located. The broaching operation is shown in Fig. 2, and a series of five progressive broaches are used to obtain the final size of slot.

It will be noted that the broach is built up with inserted cutters A, which are located in position by set screws. These cutters are made of super high speed steel and are easily renewed when wear or breakages occur, the body B of the built-up broach being made from a good quality carbon steel. The boxes are previously surface ground on one face, which is used as a base line for locating in the broaching fixture, and the rough cored slots in the box are set in the correct position relative to the fixture by adjusting screws. The broaching method ensures that the size of the dovetail slot is standard for every box, and also facilitates the machining of the gunmetal inserts to standard sizes. The latter are machined on an Archdale horizontal milling machine in conjunction with a special milling fixture shown in Fig. 3. It will be noted that two inserts are located in the fixture, and the gang of cutters are arranged to machine the inclined face and half the back face A. At each pass of the cutter one insert is reversed and placed in the opposite side, and this enables one insert to be completely machined at one pass of the cutter. A special profile gauge, with the necessary allowance for ensuring a good fit, is used for each type of insert, and the method outlined of machining the slot and the gunmetal insert is such that it is not necessary



Horwich works, London Midland & Scottish Railway

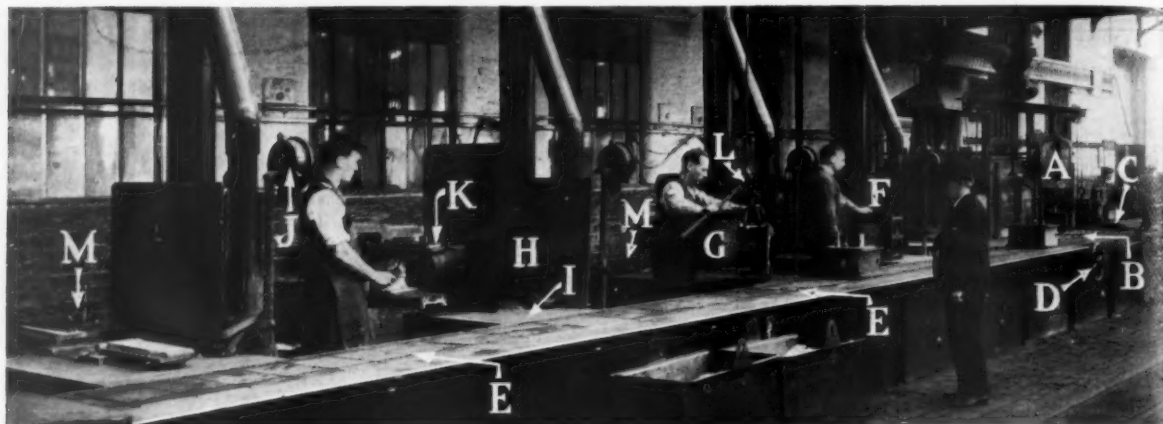


Fig. 4—Range of furnaces with roller conveyor in front for transferring axleboxes

to fit each insert to any particular box, and thereby all unnecessary fitting is eliminated. The operations of fitting the liner and the gunmetal insert are carried out exactly as in the case of repair axleboxes.

Furnace Treatment

Both new and repair axleboxes, after the inserts have been fitted, are conveyed by roller conveyor to a twin chambered furnace as seen in Fig. 4, at A. Immediately in front of this furnace and directly in line with the roller conveyor, a series of rollers, as at B, are fitted, and these enable the boxes to be placed freely in the furnace and later withdrawn with a minimum of effort. It will be noted that the roller conveyor C is set at an inclination in order that the boxes may be moved direct on to the furnace rollers previously described. Each furnace is fitted

with two Selsas gas burners, which are operated by the Docking system. The handwheel D is used for elevating and lowering the furnace doors. The furnace is so designed that all the old metal obtained from the repair axleboxes in the heating operation is conveyed through a grid which forms its base to a hopper for conveying the metal into ingot pots at the rear of the furnace. The previous method employed was to de-metal the axleboxes first, thereby releasing the old inserts, which were then taken out to enable the fitting of new inserts and liners and other parts to be carried out; they were then transferred back to the furnace for heating up for the metalling operation. The operations in the present method have been reversed, i.e., the inserts are pressed out cold and new ones refitted before the axlebox enters the furnace. In the process of heating the boxes to the necessary temperature for tinning,

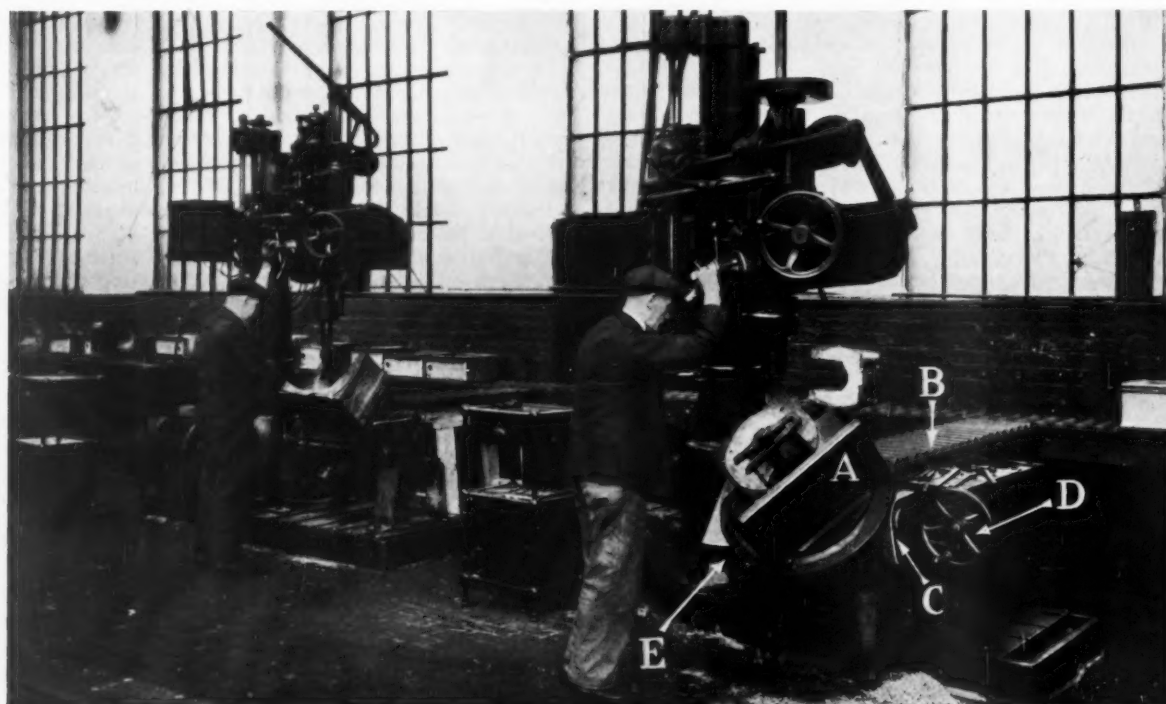


Fig. 5—Drilling oil holes in axleboxes on Asquith radial arm machines

they are at the same time de-metalled, thereby considerably reducing the time and labour involved in the old method.

After the required temperature has been obtained for tinning, the axlebox is withdrawn direct from the furnace to a mechanical conveyor E, which traverses at the rate of 18 ft. a minute. This conveyor carries the boxes to the different sections, F, G, and H. Each section is fitted with a metal pot and worktable I. In conjunction with each pot, a pyrometer and temperature indicator, as at

conveyor M is arranged to feed all the subsequent machining and fitting operations. The box is moved on this conveyor to a radial arm driller, Fig. 5, for the next operation of drilling the oil holes, and also the keep-pin hole in the case of new boxes. A special universal work fixture A is arranged on the table of this drilling machine and also at the end of the branch conveyor B. The boxes are moved along the latter conveyor direct on to the fixture. On this fixture the axlebox can be freely rotated to the required angle for drilling, and the particular

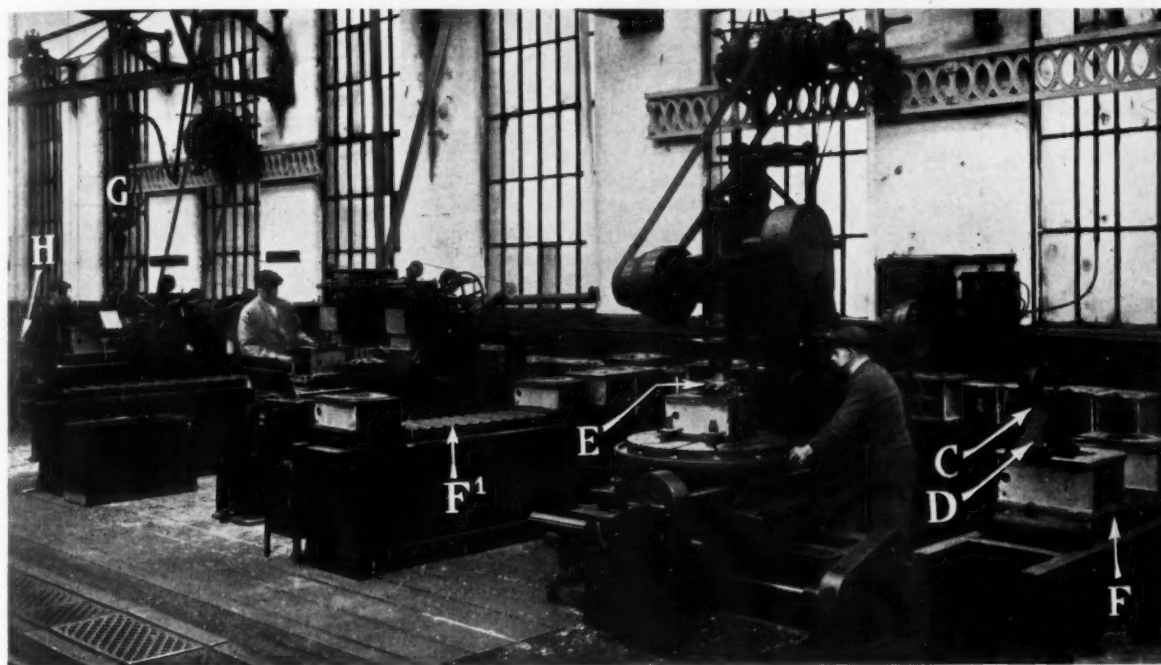


Fig. 6—Face milling liner plates on Muir vertical milling machine

J, are also fitted to enable the operator to control the temperature of the metal according to the grade being used, and also to prevent overheating. The operator transfers the axlebox from the mechanical conveyor to the worktable, adjacent to which is a special universal work fixture K, mounted on a pillar, so designed that it can be pivoted to pick up the box from the worktable. The axlebox is fastened in a vice arranged with left and right hand screw, and it can be swivelled in any position required for the tinning and metalling operations. This fixture eliminates the old method of positioning the boxes by hand during the tinning and metalling operations which necessitate, in the majority of instances, turning the box in seven different positions. As the average weight of these boxes is $3\frac{1}{2}$ cwt., it will be appreciated that the introduction of this work fixture has considerably reduced fatigue to the operator. To facilitate metalling of horns, an adjustable fixture has been introduced which regulates the thickness of metal and also ensures the correct allowance for machining. This eliminates the old method of packing the end with strips.

Machining and Fitting Operations

After the metalling operation has been completed, the axlebox is released from the work fixture by a special lever lifting arrangement L, and lowered on to the roller conveyor M, adjacent to the wall and running parallel with the mechanical conveyor. From this point the roller

angular setting for each type of box is marked on the quadrant C. In order to facilitate easy rotation of the boxes in this fixture, the large quadrant C is used in conjunction with a worm and wheel D, the latter being fitted with ball thrust bearings, and a suitable balance weight E is arranged to compensate for the different positions and weights of boxes.

On completion of this drilling operation the axlebox is returned direct *via* the branch conveyor to the main conveyor and thence to a steel worktable adjacent to the conveyor. On this table the cast iron keep and cover plates, &c. are fitted, after which the axlebox is moved along the conveyor to a vertical milling machine, see Fig. 6, for the face milling operation of the liner plate, which was fitted at the initial stage of the line. The axleboxes are conveyed to a convenient position adjacent to the machine by the branch conveyor F. It will be noted that the lifting of the axlebox from this point to the machine table is carried out by the lever lift C, previously described. In this case the hook or grab D is designed to grip the axlebox in the reverse position, *i.e.* under the flanges. The liner plates are face milled to standard limit gauges, and suitable height gauges are used for setting the cutter to the correct height according to the class and type of axle box dealt with. A special type of inserted button face milling cutter, E, has been adopted for this operation and has given excellent results from the point of view of efficiency and number of boxes to a grind.

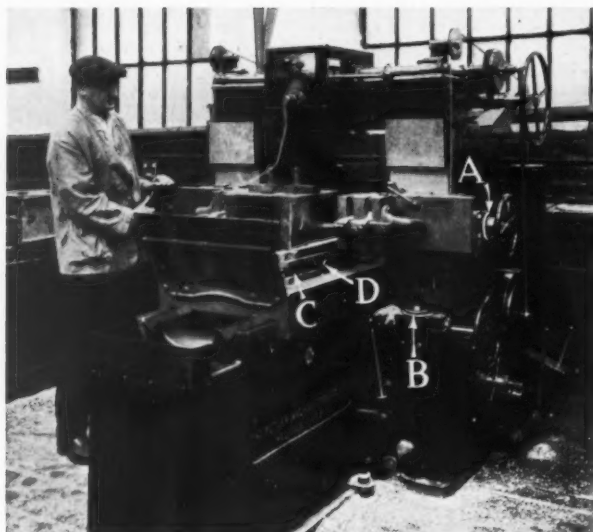


Fig. 7—Machining horn faces on high speed Butler planing machines

After this operation the box is moved by the lever lift to the next branch roller conveyor F¹, ready for the following operation. This consists of machining the horn faces to size and it is carried out on special purpose 24-in. high speed Butler planing machines, Fig. 7. The use of the new link motion on this machine, combined with forced lubrication to all parts, enables much higher speeds to be used and maintained than is possible with the normal type of link motion. The friction clutch and gearbox controls are duplicated at the front and rear of the machine. The toolboxes can be fed in either direction, separately or in unison, and one can be adjusted either vertically or horizontally while the other is feeding. Micrometer collars A and B are fitted to both the horizontal and vertical feed screws, while a number of fixed and adjustable stops are fitted for gauging. The tool boxes are balanced to ensure smooth finish and easy manipulation. The range of speeds is as follows: 8, 11, 17, 24, 34 and 52 cycles a minute. A special work fixture C is dowed in the centre of the machine table, and the top table of this fixture is arranged to swivel on a hinge pin D to give the necessary machining clearance required on the flanges of certain types of axleboxes. The liner face previously machined is set on inserted buttons in the top table of the fixture, thus ensuring correct alignment for the machining of the horns, and also a standard thickness of flange. A

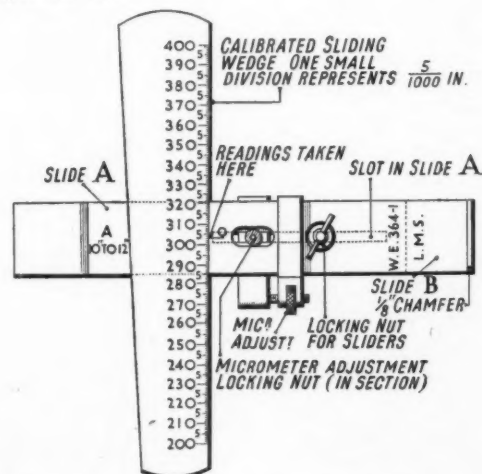
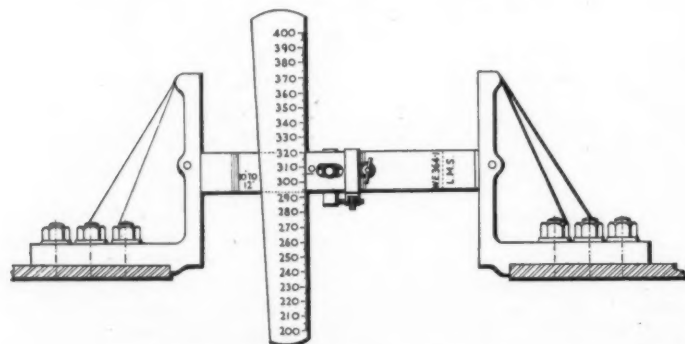


Fig. 9 (left)—Hornblock measurement gauge; Fig. 10 (right)—Detail of hornblock measurement gauge

I. M S—Chief Mechanical Engineer's Department.

HORWICH Station.

SIZES OF REPAIR AXLEBOXES FOR MACHINING.

No. 13239 LEADING Journals

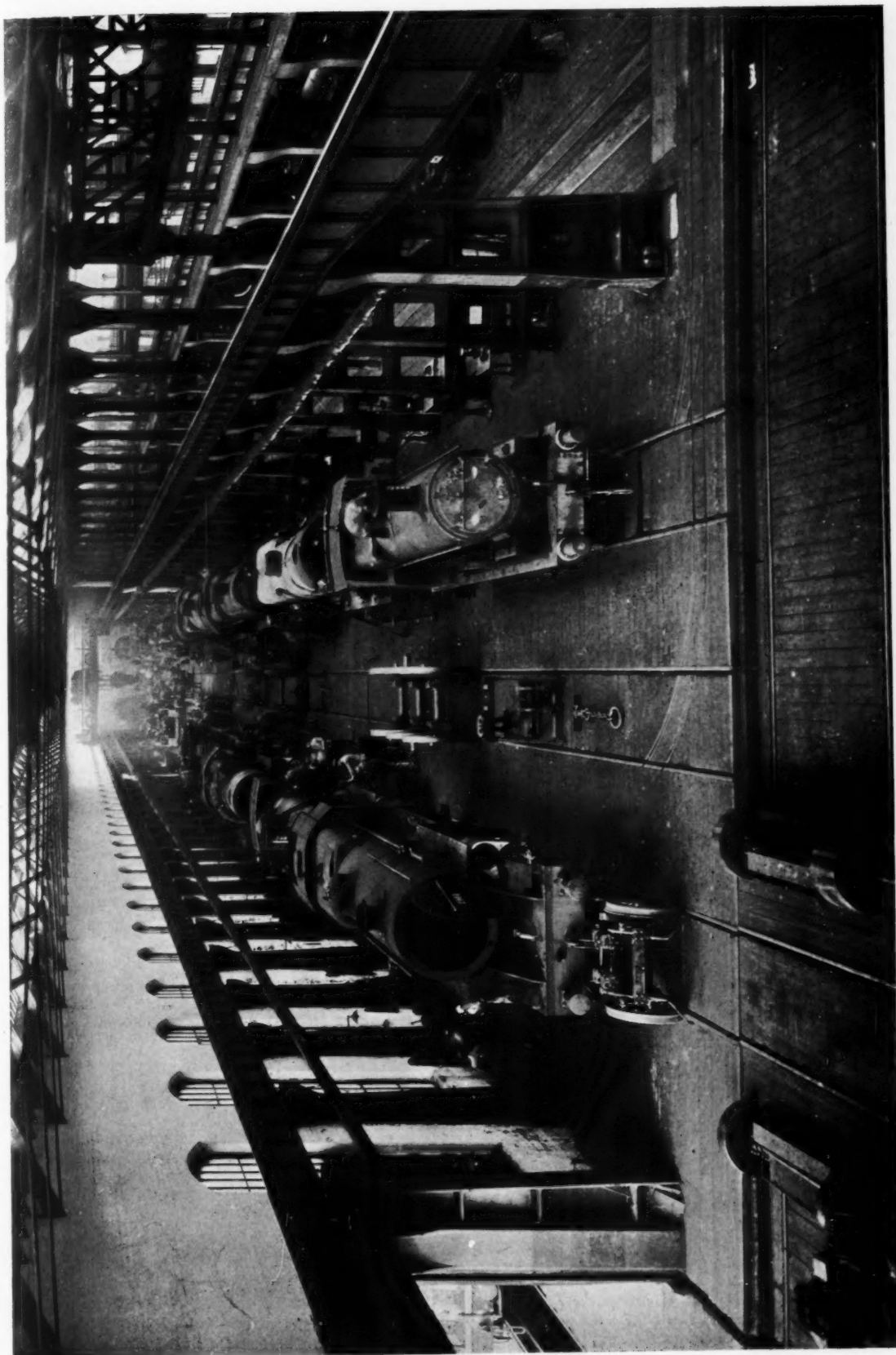
	DIA.	Wheel box to centre of journal	Collar to centre of journal	LENGTH. TOTAL	Radius	Width between horns	Datum points
R.H.	8.437	5.505	5.003	11.008	.75	305	+ .012
L.H.	8.426	5.504	5.001	11.006	.75	303	+ .007

Date 15.12.34

Signed *Benner*
B.M.

Fig. 8—Inspection form giving sizes and tolerances

special setting gauge is used to enable the box to be quickly located in the correct relative position to the centre line of the box. This gauge is arranged with suitable dowel pins which engage in hardened steel bushes in the fixture, and the method of setting the box is thereby considerably simplified. Both faces of the axlebox are machined simultaneously to the required size, which is received from the inspection department. The operator receives a size in an inspector's form, Fig. 8, which indicates the nominal size between the horn faces. The horn faces are previously re-conditioned by grinding. This size or number is taken direct from the horn with an internal adjustable gauge, Fig. 9. It will be noted that the size is obtained by a calibrated wedge which is graduated to tenths of an inch. The incline of the wedge, which is 1 in 20, gives a lateral movement on the gauge of 0.005 in. (Figs. 9 and 10). The slide A is provided with a slot in which a projection on the slide B moves, and locking devices for this and the micrometer gauges are provided as shown. The shaping operator now transfers the size or number to a special external adjustable gauge, which incorporates the necessary allowance between the axlebox and horn. The micrometer dial on each tool head is so arranged that the tools can be set to any specified size within the range, and therefore the tools are set in accordance with the number on the inspection form.



View in locomotive erecting shop at Horwich works, L.M.S. Railway. This shop is 1,129 ft. long by 113 ft. wide. There are two bays each 48 ft. wide with a central transport bay 17 ft. wide

SIGNALLING ON THE BOLOGNA—FLORENCE DIRETTISSIMA

Automatic and semi-automatic semaphores, track circuits and power signalling are used on this new trunk line of the Italian State Railways

WE have already published in our issue of April 27, 1934, a general account of the new direct line of the Italian State Railways between Bologna and Florence, known as the Direttissima, and in the present article we give an account of the signalling arrangements, illustrated by photographs kindly supplied by the railway authorities. The apparatus is of the most modern type, and represents the latest practice of the Italian State Railways in this matter.

The general appearance of the signalling on the Italian railways reminds the traveller strongly of British practice, far more than that of any other European country. The semaphore signals are of the two-position lower quadrant type, home and distant pointing to the left, as left-hand working is the rule in Italy.

Home signal arms are painted red with a white stripe, distant arms yellow with a white stripe, and the backs of both are white with a black stripe. They show red and green, or yellow and green lights respectively. The backlights are a small green light for "on" and a white one for any other position. When stop and distant arms have to be mounted together they are not placed one over the other but on the same spindle centre, the distant being behind and visible only when it is "on" and the stop arm lowered, as seen in Fig. 1. Special spectacle mechanism causes a red light to show when both arms are "on," a yellow when the distant arm

only is in that position and a green light when both arms are lowered. For ground shunt purposes, rotating discs are used.

Experiments have also been made in recent years with a special yellow signal arm called the loop signal, having a ball shaped at the end. This also, is mounted behind

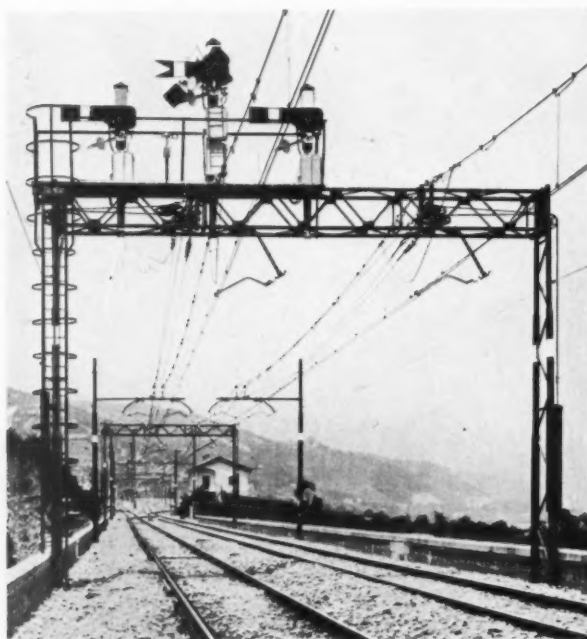


Fig. 1—Three-route splitting home signals mounted on overhead transmission gantry. Behind the centre home signal is the distant repeating the starter at the far end of the station. A yellow light is shown with the two arms in these positions

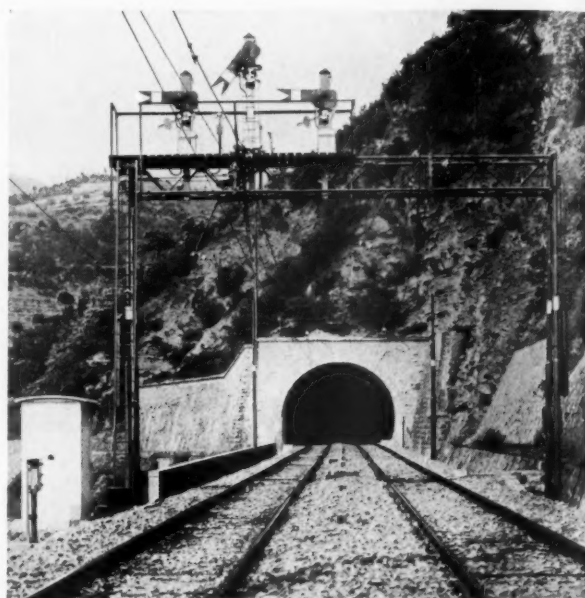


Fig. 2—Splitting distant signals for home signals as shown in Fig. 1: it also is mounted on a contact wire supporting gantry

the home arm and displayed horizontally, with two yellow lights, for movements into a loop at speeds not exceeding 30 km.p.h. (18½ m.p.h.). Disc signals for running movements, common many years ago, are now but little used. The signalling at running junctions is now done by means of bracket type splitting signals, instead of arms placed one over the other. Formerly there was only one distant signal at a junction, applying to all routes, but splitting distants are now being used, as seen in Fig. 2.

Block signalling is usually carried on by Cardani lock-and-block instruments and the principle of controlling the working of the stations from one central position by means of special apparatus is usually followed, as in several other Continental countries. There are many power signal cabins constructed on the Bianchi-Servetaz hydraulic system and there are others of the all-electric type, a very large installation being that at the new Milan Central station. Train despatching is also extensively used.

Principles of the Signalling on the Direttissima

The new line, being expressly laid out for high speeds, and if necessary, a frequent service, it was decided to



Fig. 3—Distant signal for automatic intermediate signal. The concrete shelter houses a telephone, transformers, lamp batteries and relay and track feed cases

instal continuous track circuiting with automatic and semi-automatic signals, providing a maximum block section length of 5 km., to obtain which intermediate automatic block signals, with their own distant signals, have been installed in some cases mid-way between the stations. All signals are of the semaphore type except those in tunnels,

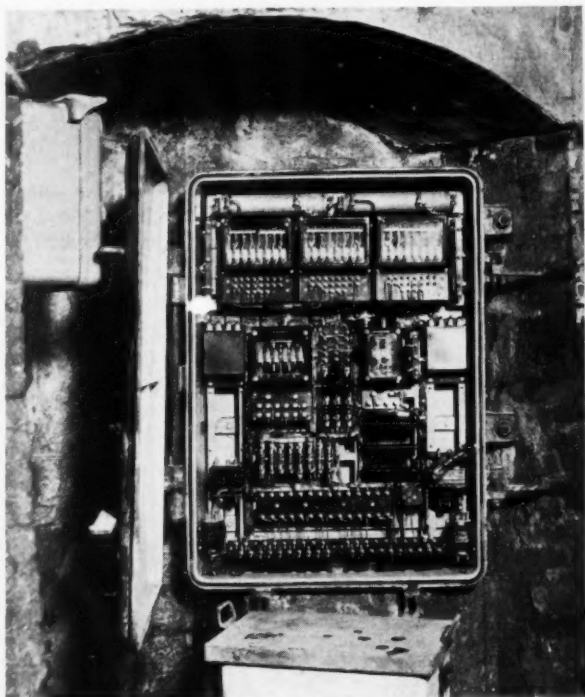


Fig. 4—Relay case in tunnel with door open

where light signals are used, and are continuously lighted. The intermediate signals have two 10-V., 10-W. lamps, one being held in reserve, fed from trickle-charged nickel-alkaline accumulators placed near the signals, while the signals at stations are provided with two 150-V. 15-W. lamps, except the ground discs which have one lamp only. The longest track circuit is about 1,500 m. (1,640 yd.). Double-rail circuits with impedance bonds designed for 500 amps. a rail, cross connected every 2 km. (1¼ m.), are used between stations, but within station limits single-rail track circuits predominate. Rail joints are of the Weber type. Motor induction relays and two element vane relays are used, according to the type of track circuits, with

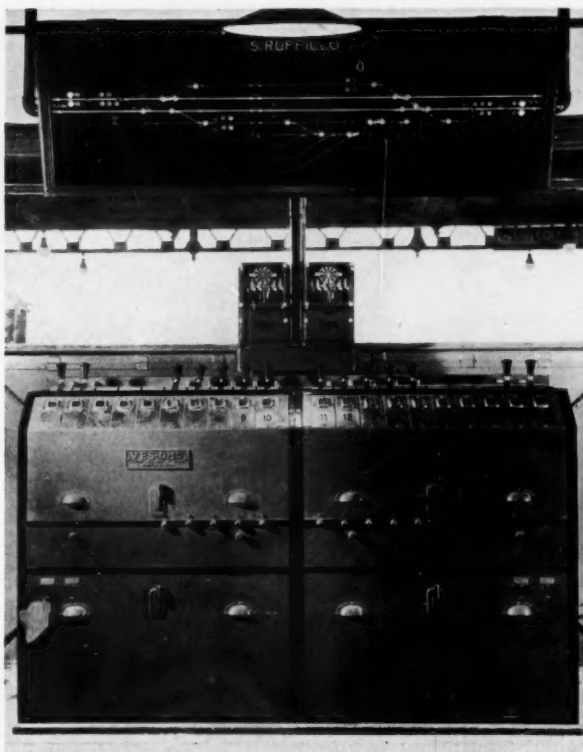


Fig. 5—Diagram and power frame in signal box at San Ruffillo station, Bologna

phase regulating condensers and the necessary apparatus to protect against external current derived from the traction circuit.

The signal controls are so arranged that the starting signal at a station cannot be lowered unless the line is clear to an overlap point 100 m. (109 yd.) beyond the following intermediate automatic signal, where one exists, and unless such signal and its distant are lighted, and functioned correctly when the last train passed them. The intermediate signals worked by the accumulators above mentioned, stand normally "off" and their clearing depends on the line being clear up to the facing points beyond the home signal at the station in advance, that signal and its distant being "on" and lighted. Stick control is provided for all signals at stations, compelling their levers to be worked for every train. To improve their visibility, many signals are carried on half bracket posts, while others are carried on the contact wire structures seen in Figs. 2 and 3. The arms are moved by electric motors which turn in both directions by power,



Fig. 6—One of the signal boxes at Prato station, near Florence, where the new line leaves the old

in addition to having a clutch mechanism for returning the arm to the "danger" position by gravity alone. As will be seen from the illustrations, the design of these semaphore signals is very neat.

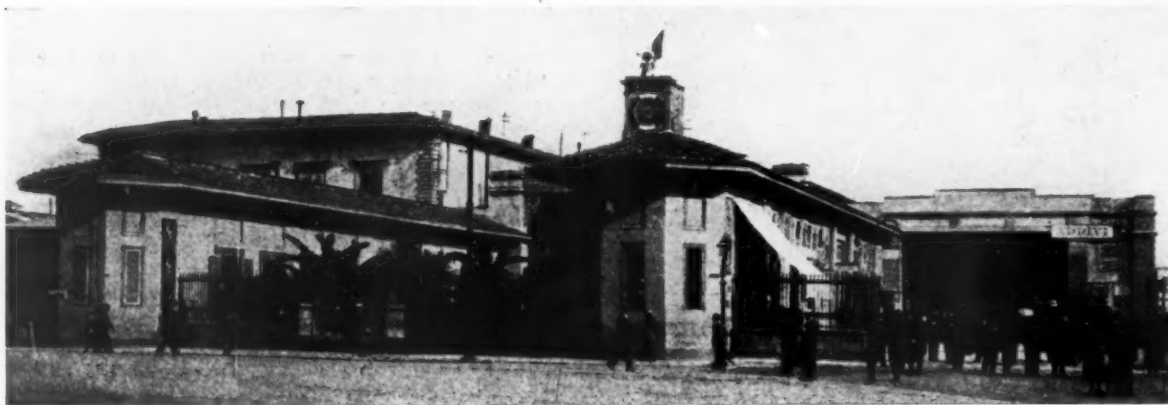
The stations are equipped with all-electric power signalling, worked either from signal cabins of the usual type, as at Prato (Fig. 6) and in the centre of the Apennine tunnel, where there are lie-by lines, or else from small cabins attached to the main station buildings, under the immediate control of the station supervision. At Prato there are two cabins, one at each end of the station, controlled by the supervision by means of station block

apparatus. Illuminated diagrams show the condition of the track circuit sections, the signals and—where they exist—the controls from the supervisor, and there are the usual switchboards and signal light indicators. The points are all trailable and, with the exception of a few not used by running movements, fitted with facing point locking and detecting. Any discordance between the position of a lever and the apparatus it controls is at once indicated in the cabin by an audible and visual warning. The point levers have electric locking, there being no locking bars, and the signal levers have track and route locking with back locks applied to them. Sealed emergency release buttons are provided for use in case of track failure, and in certain places require the consent of the supervisor before they can be worked. Important pairs of points likely to be used for shunting movements are fitted with ground indicating lanterns. The track circuit control of signals is arranged so that a signal is not put to the "on" position until the whole of a passing train has cleared it. Telephones are installed at most of the signals for communication with the stations. These are found very useful by the maintenance staff.

Sources of power

The power supply is provided through a three-phase 11,000-V. 42-50 cycle line, which runs the whole length of the new railway, either overhead or, in the longer tunnels, in cable. In the case of a few short tunnels the overhead line is led over the ground on top. The voltage is transformed down to 5,500 for the cable sections. Transformers at intervals provide the power at 150 V. for local purposes. At the stations only the track circuits, illuminated diagrams and ground signal lamps are fed by alternating current. The points and signals are operated and the running signals lighted by direct current obtained from accumulators at 144 V., or 48 V. for detection and control circuits, and 12 V. for bells and subsidiary purposes. These accumulators are charged through metal rectifiers, but a converter set is also provided which can give a complete charge in 5 hours. No apparatus is installed to cover a failure of the a.c. main supply, considered to be a most unlikely contingency, but should it occur the emergency release apparatus for the electric locking would allow most of the signalling to be carried on under caution rules. Full telephonic communication between all stations and cabins is provided.

The cost of the entire installation, including power line, telegraphs and telephones, is given as 23,750,000 lire, or approximately £407,725 at the ruling rates of exchange.



The old Florence station, S. Maria Novella in 1928. Reconstruction is now in hand, necessitated by the completion of the Direttissima and by other modern traffic developments

RAILWAYS AND ROAD TRANSPORT SECTION

This section appears at four-weekly intervals

Road and Rail in South Africa

ON many occasions it has been pointed out in these pages how pressing is the need, in the development of great areas in overseas countries, of co-ordination in matters of road and rail policy. It is referred to at length by the General Manager of the South African Railways and Harbours in the report for the year ended last March. It is pointed out that while in various parts of the Union extensive new roads with high carrying capacity have been built parallel to railway lines, little has been done by co-ordinated effort to construct or improve roads to open up new areas and to develop agricultural areas in co-ordination with the railways. These disabilities would disappear if the country had a Transport Board, responsible to a Ministry of Transport, endowed with authority to carry out a national road policy in close co-operation with the railway system. The funds available for road purposes would be consolidated and used to the best advantage; uniformity of method and incidence of road and road motor vehicle taxation would be established.

It is added that as the needs of the country as a whole would be properly reviewed it could be of material assistance in dealing with the unemployment problem, as relief road works would be undertaken according to actual necessity, irrespective of locality and with due regard to the subsequent, permanent and practical transport utility of the roads, railways, and all other methods of transport in the Union.

It is a matter on which the General Manager of the S.A.R. & H. speaks with a good deal of authority, for the railways operate road motor services on an extensive scale, the route mileage aggregating 10,535, an increase of 500 miles during the year under review. The services showed a substantial surplus—£33,095—on the year's working, but it is pointed out that bad road conditions, which became accentuated as a result of exceptional rains subsequent to the drought, also contributed to the higher operating costs, especially in South-West Africa, where abnormal flood conditions existed. Until such time as roads are properly constructed and maintained in a good state of repair the prospects of reducing running costs substantially are remote.

A striking tribute to the value of these motor road services was the comment of the Railway Affairs Commission, as follows: "We have formed the opinion that the operation of these services has been justified and that the Administration, in introducing these developmental services, has assisted considerably in opening

up new areas and stimulating agricultural development in other areas."

A Year's Results

During the twelve months ending March 3, 1934, there were 482 vehicles in service and they covered 5,049,918 miles. They carried 2,036,354 passengers, 318,109 tons of goods and 810,486 gallons of cream. The revenue worked out to 21-5d. per vehicle mile, while the expenditure on the same basis was 19-9d. Although the services were originally introduced to foster the production of light agricultural commodities, the facilities have been extended within recent years to cater for practically all classes of heavy and seasonal traffic. Grain accounted for the most freight, 32,402 tons being carried, while the next heaviest traffics were citrus and other fruits, 21,733 tons; wool and mohair, 16,748 tons; salt, 8,800 tons; lucerne, 7,297 tons; sugar, 6,259 tons.

In connection with the financial result of the year's working it is noted that no new vehicles were purchased, but that it will be necessary to replace a large number of vehicles during the current year. Further, that the demand for vehicles was exceptionally great, owing to heavy calls for the conveyance of maize and fodder to drought-stricken areas, so much so that the overhaul of a number of vehicles had to be postponed and this will make the charges in this respect heavier during the current year. Experiments are being conducted with compression-ignition engines and the report also mentions that half a dozen four-wheeled vehicles capable of taking 6-ton loads, with giant pneumatic tyres, are to be put into service over indifferently country roads where previously it was not economical to use them owing to the necessity for using dual tyres on the rear wheels.



A contrast in transport methods in Durban, Natal. The vehicle on the left is one of the Thornycroft six-wheelers in the service of the South African Railways and Harbours

A.E.C. Oil-Engined Regent for Canada

A vehicle with special mechanical and coachwork features for service in British Columbia

AS is well known to our readers the products of the Associated Equipment Co. Ltd. have been represented in various parts of Canada for some years, but special interest attaches to the vehicle seen in our illustration, ordered by the British Columbia Electric Railway Company, of Vancouver, as it is the first A.E.C. unit fitted with an A.E.C.-Ricardo oil engine to be commissioned for service in the Dominion. The chassis is a standard production of its type—a long wheelbase Ranger—and it carries a single deck body, built on the light-weight steel principle by Short Bros. (Rochester and Bedford) Ltd. In this the framing throughout is of steel with pillars of rolled cruciform section steel and waist rails of

and back-rests have latex fillings. The shade of Rexine tones with the interior decorative scheme, which includes similar material for the lower panelling, with mouldings and cappings of cellulosed polished walnut and a roof—including compass panels—of cream enamel. The smart appearance is heightened by the chromium plated fittings.

Ventilation in warm weather is aided by twelve half-drop windows—five on each side of the vehicle, one in the emergency door, and one at the left of the driver. There are also six Colt pattern ventilators in the roof and four of the scuttle type in the scuttle itself. An interesting feature—and one adding considerably to the comfort of the passengers in a vehicle working in extremes of tem-



An A.E.C. Regent chassis, with A.E.C.-Ricardo oil engine, carrying an English-built light-weight steel body, about to be placed in service by the British Columbia Electric Company in Vancouver

intercostal spot welded box section steel, bolted to the pillars. Cross members are of angle section steel built up in girder form. Cast aluminium alloy compression members are fitted into these girders in line with the chassis members to receive the body holding bolts.

The drive is arranged on the left hand side, of course, and the doors are on the right hand side, one at the front and another at the rear, with an emergency door towards the back on the left hand side. The forward door is of the jack knife, twofold, type with lower panels of $\frac{1}{4}$ in. wired glass, while the hindmost one is of the fourfold pattern, having wooden lower panels covered with metal. The doors are controlled by a vacuum engine with a treadle mat of the latest design and an accelerator pedestal interlock is included. An additional safeguard is an electric signalling light in the operating mechanism. The emergency door has a security bolt controlled from the driver's seat by a cable running beneath the body.

The seats are of the city service pattern with high back-rests framed in ash with plywood backs, with a semi-bucket effect. The upholstery is hand-buffed hide with light brown Rexine for the seat backs and both cushions

perature—is the lagging of the spaces between the inner and outer panels, side and roof panels, with Alfol insulating material. The necessary warmth in winter is provided by a Clayton thermostatically-controlled heater installed at the front of the vehicle and distributing warmed air throughout the compartment without the creation of draughts.

Front and rear bumpers are fitted and an unusual feature is the way in which the exhaust pipe is carried up the rear panel and discharges at the roof level.

Two for Ottawa

Two other A.E.C. Regents, with Short Bros. single-decked steel bodies, have recently been put into service by the Ottawa Electric Railway Company, the first commercially operated electric railway in Canada. These vehicles, however, are fitted with petrol engines, and while there are slight differences in their outward appearance from the Vancouver buses illustrated above, the specification is similar in such things as the employment of Alfol insulating material, the installation of Clayton heaters and the fitting of Colt type ventilators in the roof.

Equipment for Maintenance Work

Some of the modern appliances now available to enable the maintenance work of large fleets of motor vehicles to be carried out expeditiously and economically

FROM time to time reference has been made in these pages to the methods adopted by the railway companies in order to keep their vehicles in good condition, from the mechanical point of view as well as from that of their general appearance. Difficulties have been experienced in organising definite systems for work of this nature due to the gradual change over from horse to motor traction, a process which, although it has been speeded up in the last year or so, is bound to continue for several years yet. The extensive fleets which the railway companies now own have, however, called for the care and maintenance of the vehicles to be arranged for on a commercial basis, although the varying requirements of different areas will necessarily account for differences in the way the problems are attacked. What will meet the case in one district may not be so suitable for another.

Generally speaking, a railway vehicle has a small annual mileage; something like 10,000 miles is quoted as an

of the work, as can be seen illustrated in many of the productions of B.E.N. Patents Limited.

In a depot such as those indicated the question of painting assumes a very important aspect. Apart from the valuable preservative qualities of good paint properly applied, there is the matter of the appearance of the vehicle, it being recognised as a sound policy to keep the vehicles looking as smart as possible. The time during which the vehicle can be spared for painting has necessarily to be kept to the minimum, but, thanks to spray painting and the research work of the paint makers, resulting in special quick drying preparations, the time required nowadays is really very small.

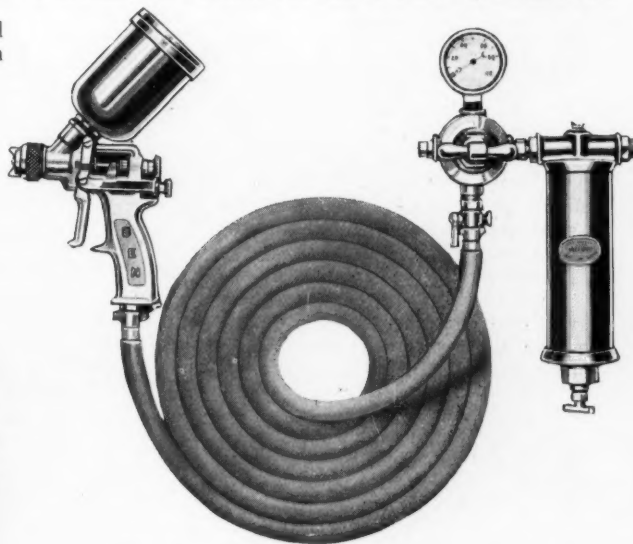
It is not too much to say that a spray painting outfit is a necessity of the service station in these days, and in the



B.E.N. F4. automatic air compressor set driven by an electric motor

average, but, though the annual figure may be small, it is generally conceded that the life is a strenuous one. This makes it more than ever essential to keep the vehicles in the best condition at all times. While the fleets are large, the fact that the area served is very widespread adds to the difficulties of methodical supervision and attention. One method is to arrange service stations at places where between 500 and 600 vehicles can be based upon each, and thus provide work for a staff of mechanics with an equipment of modern appliances.

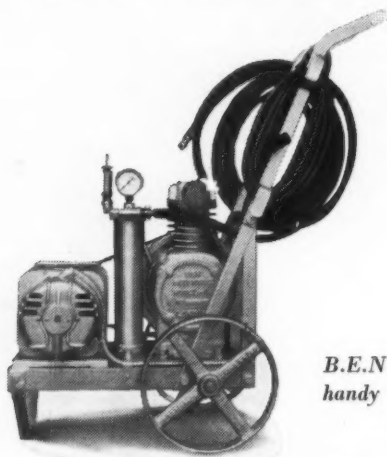
The equipment of these stations is a matter for careful consideration, but there are now available machines and appliances which enable the work to be carried out efficiently and at a low cost. In the design of these various tools much thought has been given to the special needs



The B.E.N. 1a spray paint combination

B.E.N. range there are outfits to meet practically any requirements. There are very compact fixed plants, comprising an electrically-driven compressor and a receiver, in several sizes, capable of operating from one to five guns, and they can be supplied for continuous running or for intermittent work with automatic stop-start control, operated by the pressure in the receiver. In some cases it will be preferred to have a self-contained plant for spray painting only, while in others it will be deemed advisable, especially in view of the utilisation of compressed air for tyre inflation, spring-spraying, lubrication, valve grinding, and other maintenance work, to arrange for a compressor and receiver sufficiently large to cope with all demands. In the selection of the most suitable size, the experience of such a concern as B.E.N. Patents should prove most useful. The compressors are available in a good many sizes, the smaller ones being air cooled and the larger ones water cooled, and they can be supplied with electric motor or petrol engine, or may be fitted with a fast and loose pulley to be driven by a belt from power shafting.

All B.E.N. compressors are equipped with an air cleaner or filter to prevent foreign matter being drawn into the cylinder, thus prolonging the life of valves and other working parts. In the larger sizes the lubricant is circulated by means of a pump worked by a cam on the crankshaft. There is also the B.E.N. after-cooler, the air from the compressor outlet being conducted through a copper coil interposed in the air blast from the vaned flywheel.



B.E.N. Pneu-Flator, a handy self-contained unit

B.E.N. receivers are of all-welded construction, of heavy gauge Siemens-Martin open hearth steel, and they are hydraulically tested to 300 lb. per sq. in. They are in six sizes, from 9 to 80 gallons capacity.

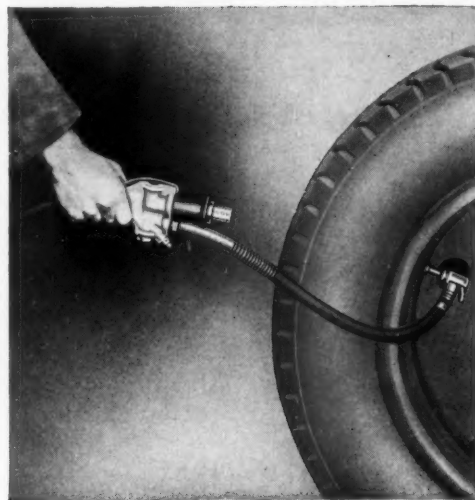
The two types of B.E.N. paint guns suitable for high grade vehicle finishing are the D.C. which is fitted with a suction feed paint container and the G. type having a gravity feed container, both, however, can be adapted for use with a pressure container. These guns are made of rustless material, plated or polished, and the material



B.E.N. sparking plug cleaner, operated by a blow gun

needle is of stainless steel. Each gun is supplied in three sizes and the complete spray outfits include an efficient moisture and oil separator and reducing valve.

Other B.E.N. pneumatic tools include the blow gun for blowing out carbon and cleaning motors; the automatic tyre inflator which is a combined gauge, air control and universal chuck, giving the exact pressure of the air in the tyre immediately the chuck is in position, and there is an air release valve; and the combined spring oiler, blow

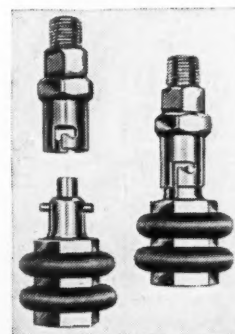


B.E.N. automatic tyre inflator, including pressure gauge and a relief valve

gun and engine cleaner which enables springs to be sprayed and ensures lubricant being applied at points which are not readily accessible. For use with a blow gun the B.E.N. sparking plug cleaner has shown that it is well worth a place in the equipment of any service station, as it enables a plug to be thoroughly cleaned in a second or two without any dismantling.

In connection with the operation of tools of this sort from a compressed air line, mention may be made of the Instantair coupling, which is now of the bayonet joint type. The plug portion of the coupling is instantly connected to a socket member, a slight turn of the wrist locking the coupling and simultaneously opening the air valve. The plug portion of the coupling normally attached to the hose is fitted with two rubber buffer rings to protect it from damage when in contact with concrete floors.

In many stations the B.E.N. Pneu-flator outfit is very popular, because of its handiness. The outfit is compactly arranged on a trolley so that it can be wheeled to wherever its services are required. It includes one of the small air-cooled B.E.N. air compressors driven by an electric motor and, of course, it includes the automatic inflator, with its tyre gauge, ranging from 20 to 130 lb., showing as soon as the universal chuck is placed over the valve, air being admitted to the tyre by compressing a lever and any excess released by pressing a button. The outfit includes a pressure chamber fitted with a sensitive ball relief valve, adjustable to release air at any outlet pressure up to 150 lb. per sq. in. Thus, in addition to tyre inflation, the machine will operate a high pressure grease gun, blow gun, spring sprayer or a small paint spray gun for touching-up work. The compressor displaces 2½ cub. ft. of air at a moderate rate of speed and thus avoids excessive vibration, overheating, loss of efficiency due to the delivery of hot air and other disadvantages of small high speed units.



B.E.N. Instantair coupling

Reducing Unladen Weight

The latest addition to the range of Albion vehicles is a chassis designed to carry a payload of 4 tons but weighing less than 2½ tons unladen

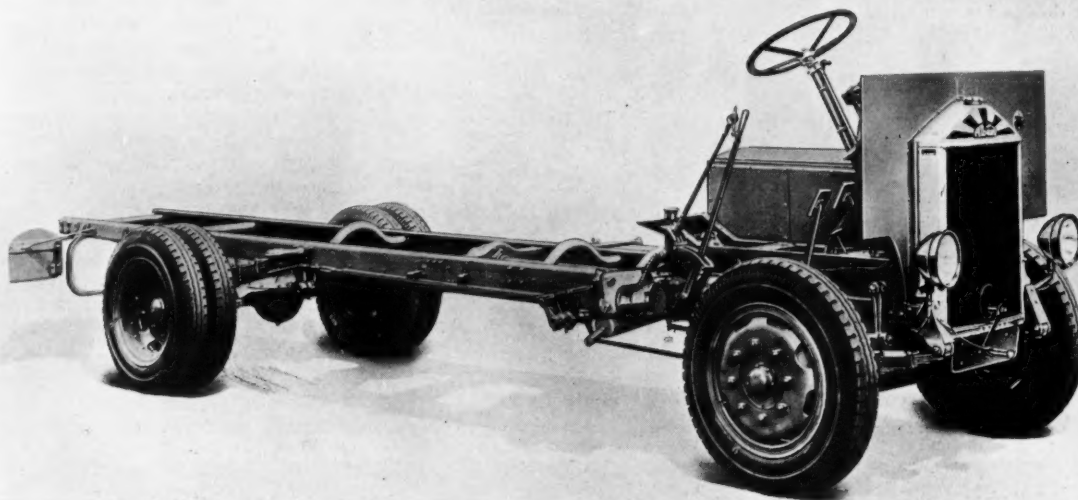
AMONG the chassis makers who have paid very close attention to the question of weight reduction so that the utmost benefit may be secured from the present system of taxation on goods vehicles, Albion Motors Limited occupies a prominent place, and the policy is illustrated in the latest addition to the Albion range. This has been produced with the object of carrying a payload of 4 tons on a vehicle which weighs less than 2½ tons unladen, and so is subject to a £30 tax and is permitted to travel at 30 m.p.h.

While a great deal of consideration has been given to the reduction of weight, the chassis is quite sturdy, the main frame members of high tensile steel being deep, and fitted with six cross-members, two of pressed steel and four of solid drawn steel tubes with large end flanges.

loaded relief valve on top of the timing gear connected to the pump by a large bore pipe ensures a flow of oil over the timing gear and all parts of the auxiliary drive.

In connection with the carburation system, it may be noted that there is a hot spot in the induction pipe. The petrol tank is arranged on the nearside of the frame, the petrol being lifted by vacuum, and there is a filter between the tank and the carburettor as well as the one at the float chamber. Ignition is by high tension magneto and the contact breaker is accessibly placed so that it may be easily adjusted when that becomes necessary.

The transmission includes a single dry plate clutch, with renewable friction faces on the flywheel and pressure plate. The thrust of the clutch withdrawal is taken on a ball bearing suitably lubricated, and a clutch brake is



The latest addition to the Albion range, illustrated above, is designed to carry a 4-ton pay load, with an unladen weight of 2½ tons. It comes in the £30 tax class, and the legal speed limit is 30 m.p.h.

Our illustration reveals the disposition of these, and also brings out the clean design of the chassis as a whole.

This vehicle is fitted with a four-cylinder engine, of which the bore is 3½ in. and the stroke 5 in., so that the capacity is 221 cubic inches. It is stated that the engine will deliver 60 brake horsepower at 2,200 r.p.m. With the cylinders and top half of the crankcase cast in one the engine is a rigid structure, making for quiet running without vibration, and this is assisted by the large section crankshaft running in three white metal bearings of ample length. There are pressed-in liners for the cylinders, and the exhaust valve seats may be renewed if required.

There is forced lubrication, the oil being circulated by a submerged pump drawing its supplies through a large area gauze filter. The oil is fed to the three main bearings, then through oilways in the crankwebs to the big ends and splashed on to the cylinder walls. A spring

fitted in the gearbox where it is well protected from dust, mud, &c., with the result that once adjusted the action remains uniform.

The gearbox includes four forward speeds. The top is the direct drive, while the other ratios are 1.77, 2.96, and 4.64 to 1, the standard rear axle ratio being 6 to 1 with an alternative of 6½ to 1 if required. It is a compact box, with shafts of large diameter, carried in ball and roller bearings, and the gearwheels being ground after hardening to ensure the correct profile of tooth. From the gearbox the drive is by an open cardan shaft, in two parts, the rear end of the front section being carried in a self-aligning bearing mounted on one of the cross members.

The drive in the fully-floating back axle is by overhead worm and that and the differential can be withdrawn without removing the back wheels. The front axle is an alloy steel forging and special attention has been given to making

the steering as easy as possible. Both footbrake and handbrake operate on all four wheels, the former being assisted by the Dewandre vacuum servo. The drums are 17 in. dia. and the shoes in the back ones are $4\frac{1}{2}$ in. wide. The springs are of ample length and have eyes bushed with gunmetal. The wheels are steel detachable disc type carrying 32 in. by 6 in. pneumatic tyres with twins on the rear wheels.

Actually, this new type is available in two wheelbase lengths of 12 ft. and 14 ft. respectively, and these give body lengths of 12 ft. 3 in. and 15 ft. 6 in. The ground clearance with the tyres mentioned is $9\frac{1}{2}$ in., while the turning circle of the shorter wheelbase model is 43 ft. The equipment is a comprehensive one, and it may be noted that chassis lubrication is effected by the Tecalemit oil-gun system.

Container Developments in U.S.A.

In connection with the development of co-ordinated fast freight handling in the United States, the American Car & Foundry Company has recently built two flat railway trucks, one for the Wabash system and the other for the Delaware, Lackawanna & Western line, each capable of accommodating two large containers. These containers are of the covered box type, 20 ft. long, 7 ft. 4 in. wide and 7 ft. $4\frac{1}{2}$ in. high, giving a cubic capacity of 1,047 cub. ft. They are of pressed steel construction and are mounted on eight castors of the double roller, swivel type, by which they may be rolled either sideways or endways from the rail truck to a specially designed trailer for haulage by road to their destination. The castors are mounted in two rows, each 2 ft. $2\frac{1}{2}$ in. from the centre line and the two at the ends are linked together to form a steering device for use when the container is being transferred. The trailer is fitted with an elevating platform operated by hydraulic cylinders to facilitate the transfer of the container from the rail truck to the trailer. The tractor and trailer form an articulated unit.

The Dunlop 90 Tyre

The new Dunlop 90 tyre introduced at the Olympia Car Show in October last is now available in the wired type sizes in both Fort and standard qualities. It does not supersede the triple stud tyre, but is alternative to it, both types being listed at similar prices for 1935. The 90 tyre has been introduced following on researches at both the laboratory at Fort Dunlop and the science department in the Dunlop cotton mills at Rochdale, the biggest mills under one roof in the world. The tread is built upon a foundation of cords completely insulated with rubber

from one another, and it has sharp edges which bite through road grease to the surface beneath, and resist any tendency to slip when cornering, and the notches in the linked central studs check forward slide. The first 90 type tyres were severely tested in the test house at Fort Dunlop, including a reproduction of rough road conditions on the rotary testing machine and the dropping upon the tyre from heights up to 20 ft. of a knife edge weighted to 2,850 lb

Co-ordination in South Australia

In the annual report of the South Australian Railways Commissioner for 1933-4 the benefits of co-ordination are dwelt upon. It is stated that in 1932 a co-ordinated form of transport was introduced at Murray Bridge by utilising the services of a carrier who, prior to the functioning of the Transport Control Board, conveyed the bulk of general merchandise traffic by road between Adelaide and Murray Bridge. This service also makes provision for goods to be delivered to consignee's premises in Murray Bridge at the rates which were obtaining prior to the operation of the Board. With a slight adjustment of rail and delivery charges this was made possible, and the arrangement has since operated to the mutual satisfaction of the railways, the carrier and the customers. Road motor competition to Broken Hill created a difficult problem, but with the co-ordination of Broken Hill carriers the traffic has very largely been regained to the railways, and it is stated that there is no reason to doubt that traders at Broken Hill are, at present, securing very reasonable rates, also expeditious and safe transport, while the traffic from the Barrier has been appreciably restored as the outcome of such co-ordinated arrangements.



Among recent orders for Karrier Cob-Major tractors, similar to that in L.N.E.R. service seen above, is one for 15 for the South African Railways and Harbours, which has been operating six Karrier Colts, a similar type of vehicle but carrying a 2-ton load instead of handling trailers of double the capacity. 100 of the Karrier Cob-Majors have been ordered by the L.M.S.R. and 35 by the L.N.E.R.

G.W.R. Motorisation Schemes

Traffic Commissioners grant all new licences sought

THE grant by the Metropolitan Licensing Authority of licences for 75 articulated motors to the Great Western Railway Company means a further step in the direction of the substitution of motors for horses in the London area by that company. At the South Lambeth depot in 1931 the whole of the stud of 92 horses was dispensed with in favour of motors with a resulting economy and increase of collection and delivery facilities to the trading community. At Paddington, the company's principal London depot, and Smithfield, there are over 400 horses engaged on cartage, and with so formidable a stud a gradual change is essential. The recent purchase, which involves the displacement of approximately 115 horses, is understood therefore to be an experimental instalment to be placed in service during the course of twelve months, thus allowing time for the training of drivers and the complex reorganisation inevitable with such a change. No objections were lodged to the company's application for licences.

Similar motorisation schemes at the comparatively small depots of Swansea and Haverfordwest, coupled with applications for five motors for other purposes, were greeted by certain periodicals devoted to road haulage interests with large type injunction to South Wales hauliers to "wake up" and fight the company's application. Seven large road hauliers responded and the application was hotly contested before the South Wales Licensing Authority at Cardiff on Friday last, January 11. The ground of objection was that in the motorisation schemes more motors were asked for in substitution of horses than were required and that the surplus strength was designed to compete with the vehicles of local hauliers. Mr. Bertram Tee, Assistant Road Transport Superintendent, pointed out in his evidence that nearly 50 per cent. of the time on each horse round was taken up in standing at traders' premises and that in this respect the motor offered no advantage over the horse. If, however, any road haulage expert could show the company how to cover the horse rounds efficiently with a less number of motors than were contemplated it would be delighted to adopt his suggestions. His company had been in business a long time (the motor service between Haverfordwest and St. David's for example having been established for over 20 years) and it might be expected to be fairly accurate in its estimates.

Suspicion was aroused by the magnitude of the company's motorisation developments, it being alleged that they were merely camouflaged attempts to take advantage of the improved prospects in the road haulage industry. Mr. Tee, however, explained that the recent expansion of railway schemes had received its real impetus with the advent of the articulated lorry. This machine, with its spare trailers and easy coupling and uncoupling mechanism, reproduced the advantage which had hitherto been the monopoly of horse haulage. Until its advent

the heavy cost of the self-contained motor and the waste thus entailed in the disproportionate standing time on railway collection and delivery journeys had made progress slow.

The now familiar demand was made that having regard to the admission that the motors in place of horses were intended only to cover a radius of about 3 miles, the company should be given a B or Limited Carrier's Licence, with a restriction to similar distances. It was urged that



One of the Scammell mechanical horse outfits now being put into service by the G.W.R., in place of horsed drays, the licence applications for which were strongly but ineffectually opposed in South Wales last week

the B licence was designed to apply to hauliers having another business, and the railway company was an hotel proprietor, passenger carrier and warehouseman. It was shown in evidence that any system which earmarked certain vehicles as tied to a limited radius from a specific base would destroy the mobility of the company's fleet and might easily entail further additions to the motor strength to overcome the disabilities thus created.

Mr. E. Gilbert Woodward, in summing up for the company, stated that no attempt had been made to attack the evidence put forward in respect of increasing railborne traffic. The contention that B licences should be granted could not be upheld. A railway was a railway, and it could not be said to have another business in the sense implied in the Act. Vehicles attached to its hotels held C licences. The underlying fear of pirating had not been supported by any evidence. In fact, the attitude of the objectors irresistibly recalled the battle between Tweedledum and Tweedledee in Lewis Carroll's "Through the Looking Glass." In warning Alice not to come too near, Tweedledee said "I generally hit everything I can see—when I get really excited." "And I hit everything within reach," cried Tweedledum, "whether I can see it or not!"

Mr. Woodward said the attack was in the true spirit of Tweedledum.

Apparently the Licensing Authority, which reserved judgment but subsequently granted the whole of the licences applied for, shared this view.



Left: Fiat petrol express railcar in service between Ventimiglia and Oulx. Italian State Railways. This is referred to in a letter to the editor published on page 86

Right: The recently re-constructed Montmartre funicular railway, Paris, opened on January 15, with electric traction. It replaces the well-known old line opened in 1900 and abandoned in October, 1931



Left: Friedrichstrasse station, Berlin, decorated with Nazi flags and inscriptions in connection with the Saar plebiscite (See editorial note on page 81)

RAILWAY NEWS SECTION

PERSONAL

The L.N.E.R. announces that Mr. H. W. J. Powell, F.S.I., F.A.I., of Messrs. Powell & Powell, Chartered Surveyors and Auctioneers, Cardiff & Newport (Mon.), has been appointed Estate and Rating Surveyor (Southern Area), in succession to Mr. A. J. Brickwell, who will retire from the service under the age limit in February next.

SPANISH RAILWAY STAFF CHANGES

The Madrid, Saragossa and Alicante Railway (M.Z.A.) Company announces in connection with the re-organisation of the various departments the following changes in its staff:—

Traffic Department

Señor Pedro Alix, Assistant Operating Superintendent to be Chief Operating Superintendent.

Señor Ernesto de la Gándara, Assistant Trains Superintendent, to be Assistant Operating Superintendent (Administrative).

Señor Nicanor Gavín, Assistant Trains Superintendent, to be Assistant Operating Superintendent (Train Movements and Claims, Barcelona).

Audit Department

Señor Francisco Gaspar, Chief Audit Accountant of Old System, to be Chief Audit Accountant of combined Catalan and Old Systems.

Señor José Canals to be Assistant Audit Accountant.

Commercial Department

Señor Luis Lerma and Señor Emilio D'ocón, to be Chief and Assistant Chief of Commercial Service respectively.

Locomotive Department

Señor Pablo Dumail, Assistant Locomotive Superintendent, to be Assistant Locomotive, Carriage & Wagon Superintendent.

Way and Works Department

Señor Pablo Diz, Assistant Chief of Way and Works, to be Chief of Way and Works.

Sir Reginald MacLeod has resigned his seats on the boards of the Railway Share Trust & Agency Company, the Railway Debenture and General Trust Company, and the Anglo-American Debenture Corporation. Mr. A. H. Wynn has resigned his managership of these companies and been co-opted to fill the vacant seats on the boards. Mr. C. A. Gillam takes charge of the investment departments.

Mr. James Williamson, V.D., M.I.E. (India), who, as announced in the New Year Honours list—published in our issue of January 4—is receiving the honour of knighthood, is Agent of the Bengal and North Western and Rohilkund and Kumaon Railways, as well as being President of the Indian Railway Conference Association for the year ending March 31, 1935. He is an engineer with long experience on the Bengal Dooars and B. & N.W. Rail-

Mr. H. S. Aspinall has been appointed Deputy General Manager, London and Export, the English Electric Co. Ltd. He will continue to act as Manager of the Diesel Engine Department, and will be assisted by Mr. R. H. Green (late Sales Manager of Petters Limited) as Manager, Diesel Engine Sales. Mr. Aspinall and Mr. Green are located at the company's registered office, Queen's House, Kingsway, London, W.C.2.

Sir Robert Highet, late Agent and Chairman of the East Indian Railway and Chairman of H.E.H. the Nizam's State Railway, left estate valued at £56,536 (£56,037 net).

We regret to note the death, on January 13, of Dr. J. A. Kalfi, since 1933 Minister of Public Works at The Hague, and, prior to 1929, General Manager of the Netherlands Railways.

Mr. C. J. Dadswell, B.Sc., Ph.D. (London), who in May last was appointed to take charge of the Cammell Grimes-thorpe Foundry of the English Steel Corporation Limited, has been awarded the Diploma of Ingénieur de l'Ecole Supérieure de Fonderie in Paris, a diploma never before awarded to an Englishman. Mr. Dadswell took his B.Sc. (London) with first class honours, in 1925, and the Ph.D. in 1927, and served his apprenticeship at Wolv-ton works, L.M.S.R. He has had wide experience in Sheffield and—thanks to winning a Robert Blair L.C.C. Fellowship in 1932—in France, Italy, Belgium, Luxembourg and the Saar. He came out top in the exam. following a special course for foundry executives at the Ecole Supérieure de Fonderie, a fine achievement for a foreigner.

We regret to record the death, on January 16, of the Rt. Hon. Viscount Knutsford, who until the death of his twin brother, the late Viscount, in 1931, was also well known as the Hon. Arthur Holland-Hibbert. He was a Director of the London Midland & Scottish Railway, represented that company on the West London Extension Board and was Chairman of the Dundalk, Newry & Greenore Railway Company. *The Times* records that "He was one of the oldest railway directors in the country, having been first introduced to the board of the



Mr. James Williamson, V.D., M.I.E. (India)

Agent of the Bengal & North Western Railway and President of the Indian Railway Conference Association, who is receiving the honour of knighthood

ways, both of construction and maintenance, and rose through the various grades to become Chief Engineer, in 1920, and finally Agent, in 1928, of the Bengal & North Western and Rohilkund & Kumaon Railways. His intimate knowledge of the Gangetic Plain, and especially of Tirhut, has doubtless been of great value to him and to his directors in the vast repair works necessitated by the recent earthquake, and it is significant that two of his Assistant Engineers, Messrs. Hypher and Smyth, have each been awarded the M.B.E. in the honours list for their work in this connection.

London & North Western Railway as long ago as February, 1880, being picked out by Sir Richard Moon, who saw in him a very promising young man... He took a high view of his duties as a director, and his judgment, ripened by long experience, was much valued by his colleagues.

Mr. A. W. Szlumper, sometime Chief Engineer, Southern Railway, left estate valued at £11,853.

Mr. L. Hore-Belisha, Minister of Transport, has appointed Mr. D. E. O'Neill to be his Private Secretary in place of Mr. Aubrey Clark, promoted.

INDIAN RAILWAY STAFF CHANGES

Mr. R. M. Sinha has been appointed to officiate as Deputy Chief Engineer, Signals, E.I.R., as from November 15, 1934.

Mr. F. R. Morgan, Officiating Chief Engineer, N.W.R., reverted to Deputy Chief Engineer on December 6, 1934.

Mr. H. W. Meakins has been appointed to officiate as Deputy Traffic Manager, E.B.R., as from November 29, 1934.

Mr. A. C. Robertson, Officiating Deputy Chief Operating Superintendent (Power) E.I.R., has been granted 12 months' leave as from December 8, 1934.

Mr. L. W. Van Someren, Deputy Traffic Manager, E.B.R., has been granted 3½ months' leave, as from November 29.

Mr. J. E. M. Rowland has been appointed to officiate as Chief Engineer, Burma Railways, as from December 4, 1934, and Mr. J. H. Rickie as Deputy Chief Engineer from the same date.

Mr. R. G. Manson, Traffic Manager, A.-B.R., returned from leave on December 3, and assumed charge from Mr. R. S. Vipan, who reverted as Deputy Traffic Manager on the same date.

The following officers of the E.I.R. have been confirmed in their appointments:—

Messrs. D. M. S. Robertson as Chief Commercial Manager (March 19, 1934); E. E. Ellis as Deputy Chief Commercial Manager (June 30, 1934); L. E. Vining as Deputy Chief Operating Superintendent, Movement, provisionally (June 15, 1934), and H. H. Yule as Divisional Superintendent (June 15, 1934).

Mr. H. T. Martin, Chief Engineer A.-B.R., has been granted leave preparatory to retirement, as from December 6. In consequence, Mr. F. J. Salberg has been appointed to act as Chief Engineer, Mr. L. F. W. Nolan as Deputy Chief Engineer and Mr. W. H. Prendergast as Deputy Agent, as from the same date or from December 7.

Evolution of Passenger Train Transport

Mr. H. L. Wilkinson, Superintendent of the Line, Great Western Railway, presided over a well-attended meeting of the G.W.R. Lecture and Debating Society at Paddington station on January 10, when a paper on "The Evolution of Railway Passenger Train Traffic" was read by Mr. H. J. Peacock, Divisional Superintendent, Worcester.

Before proceeding to a sectionalised analysis of his subject, the speaker referred to the change in outlook with respect to passenger train traffic caused by the sudden appearance of a virile and unrestricted competitor in the form of the motor coach. Fortunately, after the first shock of this menace had been withstood, the precept that attack was the best line of defence was adopted by the railway companies. This inspired an entirely changed outlook, stimulated endeavour, imparted zest, discovered new fields of activity, and brought renewed hope and courage to an industry that many were saying was moribund. The magnitude of railway passenger-carrying business was revealed by the fact that the number of passenger journeys, including contract ticket journeys, on British railways during 1933 was 1,170,000,000, and the resultant revenue £49,000,000.

The speaker traced the evolution of railway fares from 1836, when an Act of Parliament was passed making it unlawful to charge a greater sum than 3½d. a mile for individual passenger conveyance, and the later and more important Act of 1844 which provided for the running of "parliamentary trains" at a charge not exceeding a penny a mile. The parliamentary fare became the ordinary fare, until war time conditions necessitated increases which in part still remain.

Reference to the fact that prior to 1933 excursion passengers were generally restricted to specific trains and dates in both directions, brought the speaker to a consideration of the drastic change in policy brought about by the experimental introduction of summer tickets, now standardised and improved as monthly return tickets. He thought this splendid new year gesture would be viewed by the public as indicative of modern railway enterprise and responded to accordingly.

The extensive development of day and half-day special excursions (the railway companies' bargains in travel) was further evidence of enterprising outlook, while there had been no delay in recognising the greater readiness on the part of the public generally to seek change of scene and environment on Sundays. Day and evening cheap tickets, land cruises, cruising trains, and similar facilities were also part of the story of passenger train traffic evolution.

Mr. Peacock's comprehensive paper referred to the provision of new halts, and pointed out that the number in



Sir Herbert Walker inspecting the apparatus after opening the new Southern Railway signalling school and social institute at Croydon on January 11

use on the Great Western Railway had increased from 285 in 1924 to 408 in 1934. Other subjects dealt with were railway transport and housing schemes, station and booking office design, town offices, and train arrival and departure indicators. On the design of passenger

stock the speaker entered a plea for the division of seating accommodation into individual seats (third class as well as first) on main line expresses.

He traced the evolution of the operating, engineering, and signalling provisions as they affected passenger train

traffic and spoke of the great advantages derived from the Great Western Railway system of automatic train control. A short section of Mr. Peacock's paper was devoted to parcels and miscellaneous traffic, with particular reference to the stimulus of agreed charges.

High Speed Electric and Diesel Developments in Italy

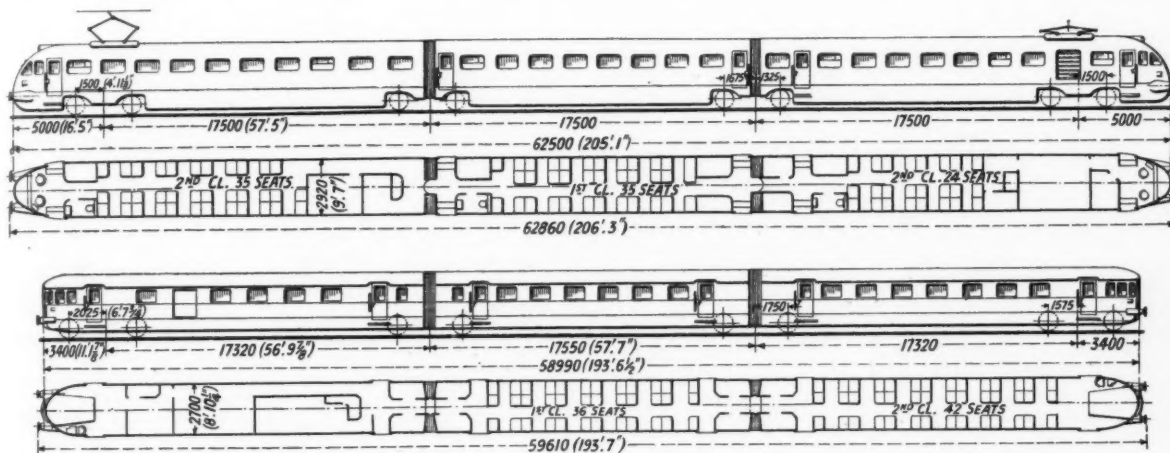
In order to provide greatly accelerated services over electrified lines and other routes now under conversion, the Italian State Railways, as announced in our *Electric Railway Traction Supplement* for December 14, has placed an order with the Soc. It. Ernesto Breda, of Milan, for six streamlined triple-articulated trains with a top speed of approximately 100 m.p.h. These trains are for use only on the 3,000-volt d.c. lines, and will probably begin their service on the Florence-Bologna Direttissima, and then be drafted to the Florence-Rome-Naples main line when eventually that is ready for electric operation.

The front and rear bogies of the new trains are each fitted with two 1,500-volt motors connected permanently in series, and the central bogies each have one motor, giving a total of 1,200 h.p. in six motors. The accommodation will be of a *de luxe* character, and seats will be provided for 35 first class and 59 second class passengers. One of the cars will have a kitchen, and meals will be served on tables between the seats. The trains will, it is stated, be air-conditioned throughout, and will tare approximately 82 tons; the proportions may be gathered from the accompanying diagrams.

Detailed studies are being made of

a triple-car diesel train of similar dimensions, but no order has yet been placed. At the moment it is proposed to drive the train with two 400 b.h.p. engines mounted directly on the end bogies, the wheels of which will be driven through mechanical transmission.

The designs indicate that the weight will be about 75 tons. The cars of both all-electric and diesel-electric trains will be of all-metal welded construction and considerable use will be made of light alloys. It is intended that the first diesel trains shall run between Turin and Venice, a distance of about 420 Km. (260 miles), to be covered in 3½ hours, i.e., at an overall average speed of 120 Km. (74½ m.) an hour.



New Italian high speed trains: above, electric; below, diesel

GERMAN HIGH SPEED RAILCAR SCHEDULE.—According to the *Kölnische Zeitung*, the Cologne division of the Reichsbahn has just published the timings to be observed by the two Flying Hamburger-type diesel-electric railcars which are to go into service between Berlin and Cologne on May 15. Leaving Cologne at 7.10 a.m., the railcar is due to arrive in Berlin (Friedrichstrasse) at 12.20 p.m., after stopping at Düsseldorf, Duisburg, Essen, Dortmund, Hamm, Hanover, and Berlin (Zoo). On the down trip, Berlin (Friedrichstrasse) will be left at 7.11 p.m. and Cologne reached at 12.18 a.m., with the same intermediate stops except that at Duisburg. The 5 hr. 20 min. overall time of the up journey corresponds to an overall average speed for

the 360 miles of 69.6 m.p.h., and the 5 hr. 07 min. in the reverse direction to 71.9 m.p.h. At present the fastest steam train takes 7 hr. 07 min.

L.N.E.R. PETERBOROUGH MODERNISATION SCHEME.—Work is to begin forthwith upon an important scheme for the modernisation of the freight train accommodation at Peterborough (East), an important point of exchange for traffic passing between the L.N.E.R. and L.M.S.R. In addition, a large volume of traffic passes from and to the L.N.E.R. main line at this point. Modern operating conditions involve running coal trains made up of 80 to 100 wagons and a feature of the present scheme is the provision of reception roads at the East yard at Peterborough

to accommodate such trains and permit engines to be released immediately on arrival. This will involve the re-arrangement of the lines connecting with the coal traffic marshalling yard and the re-alignment of the Middle Bank group of sidings. A new down goods line is to be provided with a separate connection to the main line, which will hold the longest freight trains now operated and avoid crossing the path of trains in the up direction.

When these improvements are carried out, the marshalling yard at Peterborough East will be one of the most up-to-date in the country, and this will assist materially in further expediting the transit of traffic to and from East Anglian stations.

The Year's Prospects in Canada

Mr. S. J. HUNGERFORD,
President, Canadian National
Railways

The improvement in the earnings of the Canadian National Railways which commenced in the latter part of 1933, continued throughout 1934, with the result that the gross revenues of the C.N.R. all-inclusive system for that year will be approximately \$16,000,000 greater than in 1933. It is particularly significant that there was a substantial increase in the movement of manufactured products and merchandise, demonstrating increased business activity. The improvement in the automobile, lumber, and newsprint industries is also indicated by increased movement of these products. The grain movement during the year was slightly less than in 1933.

The benefit of operating economies made during the depression is evidenced by the fact that the increased traffic has been handled in such a manner that the net operating revenue of the system will be approximately \$7,000,000 in excess of 1933, and this despite the fact that approximately \$4,500,000 more has been expended on maintaining the property and equipment. This result demonstrates in a very real manner the ability of the system to take full advantage of increasing revenues from traffic. The figures (in thousands of dollars) for 1934 and 1933 are as follow:—

	Revenues	Expenses	Net operating revenue
1934 estimated revenues ..	164,900	152,200	\$12,700
1933 actual revenues ..	148,520	142,815	5,705
Increase	16,380	9,385	\$6,995

These results have been obtained by a strict adherence to the budgetary control of expenses. I wish to express my appreciation of the loyal co-operation of officers and employees, which has rendered such a gratifying performance possible. One effect of the improvement in traffic has been that approximately 5,000 employees returned to full or part-time work for the National railways in 1934. The increased payroll distribution during the year was approximately \$4,000,000. Some indication of the improvement in the operating efficiency of the system may be obtained from a comparison of the results for 1934 with those of 1931. With a gross revenue in 1934, which was \$35,000,000 less than in 1931, the net operating revenue improved more than \$11,000,000 over 1931.

Following upon negotiations between the Canadian railways and the various groups of organised labour, agreement was reached whereby the generally existing deduction from the standard rate basis of 15 per cent. becomes

12 per cent. on January 1, 1935, and 10 per cent. on May 1, 1935, this in recognition of the improvement which has taken place in railway earnings during 1934 and the prospect of increasing earnings in 1935. Other employees will also receive the benefit of this adjustment, except that it does not apply to supervisory officers and others whose salaries are \$2,700 per year or more.

During the year a revised pension plan was designed and approved by the Board of Trustees, to be made effective January 1, 1935. The new plan authorises a minimum basic or subsistence pension of \$300 a year and the payment of supplemental annuities derived from equal contributions by the employee and the company. The transition from the present pension plan will be carried out in such a manner that the pension equity, under the present rules, of employees in the service at the end of 1934 will not be disturbed. The revised plan will not affect pensions now being paid. A reduction in the cost to the company of future pensions will result from the operation of the new plan. Co-operative activities with the Canadian Pacific Railway continued during the year, the principal accomplishment being the extension of the passenger train pool to include all passenger train services between Montreal and Quebec, Montreal and Toronto, and Ottawa and Toronto. Further extensions of the pool have been under study during the year, and it is anticipated that additional economies in passenger train services will be obtained. Other co-operative measures involving the abandonment of parallel and functionally duplicate lines, joint operation of terminals, and many other phases of railway operations have been under study by joint committees of technical officers of both companies, and considerable progress has been made towards putting into effect a number of projects which will result in economies to the mutual advantage of both companies. The results so far obtained through co-operation, therefore, are not by any means represented by the savings already made.

The railways continue to suffer from highway competition, and the company has during the year continued its study of different methods of meeting competitive forms of transport. In the highway trucking field the railway is at present carrying on three different types of operation in an endeavour to determine which method is best suited to the railway's interest. In all three experiments charges for the collection and delivery of the freight are included in the tariff. So far each of the experiments being conducted to regain highway truck traffic has succeeded in some degree, and the experiments will

be continued until the most satisfactory solution of the problem is found.

In the passenger field the excursion rates offered during the year have been very pleasing in their result in adding to the railway passenger traffic.

Capital expenditures during the year were kept to a minimum, consisting only of those absolutely essential for the safety of operation.

The betterment in operating results in 1934 will mean that for the third successive year the new money requirements of the system will be reduced. We hope that continuing improvement in railway earnings is a definite indication that we may look forward to a gradual but sustained return to better times, in which the country as a whole, and therefore the railways, will benefit substantially.

Mr E. W. BEATTY, President and Chairman, Canadian Pacific Railway

In my New Year message to the officers and employees of December, 1933, I suggested that if the improvement then observable continued we might look forward to a brighter year in 1934 than that which was then closing. The improvement did continue, with the result that the company has had moderate increases in its gross and net earnings during the current year.

Though the rôle of a prophet is a very hazardous one in these rapidly changing times, I feel that the improvement of 1934 will be continued into 1935, and it is highly desirable that it should do so because the costs of operation during the coming year will probably be substantially increased.

It is very gratifying to be able to record that the officers and employees of the company have met the abnormal conditions with courage and efficiency, that there has been no lessening in their morale, and that they have retained their confidence in the country and in their own company. I know of no greater asset which the company possesses than the spirit of the officers and employees of all ranks.

I sincerely wish you all and the members of your families a happy and prosperous new year, and I am fully confident that in 1935 the company will continue to enjoy the benefits and advantages of your unselfish and loyal support of its interests.

FIRST PASSENGER TRAIN CROSSES ZAMBEZI BRIDGE.—The great work of bridging the Lower Zambezi, which was described in THE RAILWAY GAZETTE of February 17, 1933, and the erection of the last span in which was recorded in our issue of October 26 last, may now be said to be completed, as the first passenger train passed over its 2.3-mile length on January 14. Its completion makes it possible for trains to run through from Nyasaland to Beira, a distance of over 500 miles.

The Electrical Industry in 1934

During the last quarter of 1933 an improvement in trade became apparent in the electrical industry, and throughout 1934 the volume of business slowly increased. The demand for equipment remained, however, very far short of the productive capacity of the industry, and competition for orders both at home and abroad was extremely keen. Of work accomplished for railways there was less than usual to report, and new developments were fewer than the past progress of the industry would have led one to expect. Below are given short summaries of the activities during 1934 of the four larger firms engaged in the manufacture of electrical equipment, the references being confined to those of them having some bearing on railways.

General Electric Co. Ltd.

Railway electric traction was not responsible for much business in 1934, but 46 240 h.p. motors were ordered by the London Passenger Transport Board, identical with some 2,000 motors previously supplied.

An important improvement was effected in certain of the Osram lamps whereby an increase of from 10 to 20 per cent. in light output was secured, the greater gain corresponding with the smaller lamps (40 watts) and the smaller with lamps taking 100 watts. In the new lamps the coiled filament is coiled again and therefore they are described as coiled coil lamps. Units for 200-260 volts and consuming 40 watts were marketed on September 1, and the 60, 75 and 100 watt sizes appeared shortly afterwards. From the first the new lamps were sold at the same prices as conventional pattern Osram lamps. This type of lamp was illustrated in the description of its application by J. Stone & Co. Ltd. to locomotive headlights in THE RAILWAY GAZETTE of October 26 last, page 684.

The British Thomson-Houston Co. Ltd.

Two rectifiers were installed in an electric railway substation for the London Passenger Transport Board, each of 2,000 kW. rating at 630 volts. Three more rectifiers of the same rating were completed for installation in the board's substation at Leicester Square. At the end of the year six more rectifiers were put in hand for railway substations, these having the larger capacity of 2,500 kW. and being for 3,300 volts. The demand for high-speed circuit-breakers for traction purposes at home and abroad was maintained, and many repeat orders were received for B.T.H. type R.J.R. units.

The order was placed with this company for the equipment of an exceptionally large electric shovel excavator to be used at Corby on the new iron-

ore bed of Stewarts and Lloyds Limited. Built by Ransomes & Rapier Limited, this shovel has a capacity of 9 cubic yd., a dumping height of 70 ft., a radius of 101 ft. and a weight of 600 tons. It will enable a cut of 55 ft. to be maintained without rehandling the excavated material.

English Electric Co. Ltd.

Orders were received during the year for seven steel tank rectifiers for the Polish State Railways. These will supply power at 3,300 volts; two will have a capacity of 2,000 kW. each and the other five a capacity of 2,500 kW. each. In connection with the extension of main-line electrification on the Southern Railway an order was secured for the motors for 17 four-coach train units. Motors for 90 two-coach local train units were also ordered, so that in all a total of 320 motors will be supplied.

Following the successful operation of English Electric equipment on the Copenhagen suburban lines, the Danish State Railways placed a repeat order in August, 1934, calling for the complete electric control equipment for 20 motor coaches and 10 trailer coaches. Together with the Metropolitan-Vickers Electrical Co. Ltd., the English Electric proceeded with the manufacture of equipment for the electrification of the Warsaw suburban system of the Polish State Railways. Contracts for this were obtained in 1933 and the first equipment will be going into service in 1935.

The company has facilities for building diesel engines as well as electrical components, and during the year a 300 h.p. diesel-electric shunting locomotive was built with the co-operation of R. & W. Hawthorn, Leslie & Co. Ltd., and is working by permission of the L.M.S.R. in different yards, throughout that system. At the end of the year the L.M.S.R. placed an order with English Electric for 10 diesel-electric shunting locomotives of 350 b.h.p. Diesel and electrical machinery figure also in an order received for the equipment of a new passenger paddle ship for the Clyde service. A. & J. Inglis Limited, of Glasgow, are supplying this ship to the order of the L.N.E.R.

Metropolitan-Vickers Electrical Co. Ltd.

As already mentioned in THE RAILWAY GAZETTE, this company is working in collaboration with Mr. Pesterini on what is termed metadyne train control, and successful experiments were carried out during the year, these being a preliminary to further and more extensive trials. Less revolutionary developments included a new lightweight pantograph for electric trains, a new quick-response voltage regulator for use with motor-generator

lighting sets on electric trains, and a compressed air window wiper. Fifty of the wipers are already in operation on Southern Railway electric trains and others have been ordered.

Three 10-ton battery mining locomotives were supplied for man haulage in Barber Walker's Harworth Colliery, these having a maximum speed of 16 m.p.h., on a track with gradients up to 1 in 15, when hauling 15 tons. The batteries are of D.P. traction type. Developments in electric welding included an extension of the range of electrodes to a diameter of $\frac{3}{8}$ in. and the introduction of new types. Important changes were also effected in the dynamic characteristics of welding generators while at the same time savings were contrived in the weight of portable gear.

The General Railway Signal Co. Ltd. of London, obtained the contract for the resignalling of Howrah station on the East Indian Railway and it is expected that the new all-electric signalling will be brought into use during the early part of 1935. The apparatus is to be supplied for installation by the railway company's staff and will include an 84 lever type-D electric locking frame with an all-steel cabinet, 73 d.c. point machines, 38 searchlight signals equipped with a.c. mechanisms, 520 a.c. and d.c. relays, together with 24 welded steel mechanism cases, 232 transformers and a number of dwarf colour-light signals and auxiliary apparatus.

The Cheshire Lines Committee placed a contract for the resignalling of Manchester Central station. Here the installation will consist of a 128 lever type-D electric locking frame, 64 point machines, 70 multi-lens colour-light signals, 220 a.c. relays together with mechanism cases, transformers and auxiliary apparatus. The bulk of the apparatus for the power signalling at Bristol was completed during the year, and it is expected to be in operation soon. The Bristol East locking frame, consisting of 368 levers, will be the largest all-electric frame on any British railway. By this frame, the Bristol West locking frame of 328 levers, and the Bristol loco. frame of 32 levers, 218 point machines, 61 searchlight signals and 170 multi-lens signals will be controlled. Included in the installation will be 212 a.c. track circuits, 126 a.c. point detection circuits, 40 welded steel mechanism cases, approximately 700 a.c. vane relays and 1,100 repeating transformers.

During the year, an improved design of 2 and 3-aspect multi-lens colour-light dwarf signal known as the type-ME, was developed. The optical arrangement, using $6\frac{1}{8}$ -in. dia. outer lenses and lamps to B.S.I. dimensions, provides a spreading or concentrated beam as may be required, and although primarily designed as a compact dwarf signal, it can also be arranged for pole mounting for use as a short range high signal. This new signal will be supplied on all the contracts referred to above.

NOTES AND NEWS

Caravan Coaches, L.M.S.R.—To provide for a large extension of its caravan coach holiday scheme, the L.M.S.R. has decided to convert 58 more vehicles for this service during the 1935 holiday season. Last year 42 caravan coaches were fully utilised.

Bulk Travel Vouchers on Railway Air Services.—The railway companies have decided that the existing bulk travel vouchers used by large firms shall be accepted for air journeys by Railway Air Services Limited. The acceptance of the vouchers will be confined to railway stations, railway town booking offices, and, in the case of London, Airway Terminus and Croydon Aerodrome.

Covent Garden Station, London Transport.—It was reported in the daily press last week that the London Passenger Transport Board was considering closing Covent Garden tube station. We are officially informed that no such proposal is at present being considered, but that, when the reconstruction of Leicester Square station is completed, the fate of Covent Garden station, which handles one of the smallest traffics of any London tube station, will be considered, and abandonment is probable.

New Escalators at Waterloo.—Two new Waygood Otis cleat-comb type escalators are being installed at Waterloo station. These variable-speed escalators, are taking the place of the existing ones (introduced in 1918) leading from the concourse of Waterloo station to the Underground booking office. Their speeds will be 100 ft. to 120 ft. a minute, against 90 ft. to 100 ft. of the present ones. They will be of the reversible type, permitting both stairways to run in one direction when necessary. Although the distance between the upper and lower level is only 26 ft. 8 in., these moving stairways offer a more difficult problem than usual, owing to the rise of the tunnel being 26 deg. instead of the customary 30 deg. The new stairways will be driven by two 30 b.h.p., double chain drive motors.

A Sleeping Car Suggestion.—A correspondent in the *Eastern Daily Express* suggests a solution for the problem of provincial visitors to London whose engagements detain them past the time of their last train home, but whose destinations are not sufficiently remote to be provided with a sleeping car service, in the following terms: "The experiment proposed is for the L.N.E.R. to try out for say six months the provision of a sleeping car at Liverpool Street, which should be available for occupation from say 11 p.m. onwards, and which later should be attached to the 5 a.m. train reaching Norwich at 8.36. On the return journey this car might be attached to the 11.35

p.m. train from Norwich due at Liverpool Street at 3.40 a.m., provided that passengers need not be turned out until say 7.30."

American Railway Accident.—The Augusta Special, a fast train of the Southern Railroad (U.S.A.) was derailed on January 13, causing the death of two persons.

Southern Railway Valuation for Rating.—The Railway and Canal Commission resumed the hearing, on January 16, of the appeal by the Southern Railway against the rating assessment of its railway hereditaments by the Railway Assessment Authority at £2,180,000. The hearing was begun on December 10 and adjourned on December 21. The railway company contends that the assessment should not exceed £500,000.

Federation of Railway Lecture and Debating Societies.—The second meeting of the Federation of Railway Lecture and Debating Societies (North Eastern Area) for the current session was held at Darlington on January 15. An address was given by Sir John Maxwell, C.M.G., Chairman, Northern Traffic Commissioners, on "Some Problems of Road Transport." Mr. E. Thompson, Mechanical Engineer of the North Eastern Area, presided over the meeting, which was largely attended.

The British Railway Stockholders Union Limited.—Mr. William Whitelaw, Chairman of the L.N.E.R., will address the Railway Stockholders Union at luncheon on January 29. This is of considerable interest in view of the controversy which has taken place over the return of the wage cuts and the uncertainty that exists regarding the showing which the railways will make for the past year. By way of marking the occasion the union is extending its invitations outside the circle of its own membership.

The Week's Road Accidents.—The Ministry of Transport return for the week ended January 12 of persons killed or injured in road accidents is as follows:—

	Killed	Deaths resulting from previous accidents	Injured
England	93 (105)	24 (25)	2,874 (3,277)
Wales ...	7 (4)	1 (—)	114 (135)
Scotland	8 (18)	4 (6)	297 (357)
	108 (127)	29 (31)	3,285 (3,769)

The total fatalities for the week were, therefore, 137, as compared with 158 for the previous week.

New Telephones at Stratford, L.N.E.R.—The railway telephone installation at Stratford, L.N.E.R., is to be entirely modernised. The whole existing telephone service, both to the railway and Post Office systems, will be concentrated on a single automatic

switchboard with a 2-position manually operated section for Post Office and trunk circuits, and will be situated at the present telegraph office on Nos. 4 and 5 platforms. The telegraph work at present dealt with at Stratford will be transferred to Liverpool Street and transmitted to Stratford by telephone, thereby making available suitable accommodation for the automatic equipment.

Royal Charter Issue of "The Structural Engineer."—Following the granting of a Charter of Incorporation to the Institution of Structural Engineers, a special issue of the institution's journal, *The Structural Engineer*, has been produced. It presents a handsomely illustrated record of the history of the body and the personalities connected therewith, together with articles on structural engineering overseas which survey the progress made between 1920 and 1934 in Australia, Malaya, India, New Zealand, and South Africa. Other articles in the series on structural engineering in the twentieth century deal with bridges, dams, and marine work.

Aerodromes for Civil Aviation.—On Monday last, January 14, Sir Leopold H. Savile, K.C.B., M.Inst.C.E., presented to the Institute of Transport an interesting and comprehensive paper on aerodromes for civil aviation. After tracing the evolution of the aerodrome from the old flying ground, he defined the modern types (large terminal, municipal, and private) and outlined their requirements. Apart from the primary consideration of a suitable and safe ground for landing, other desiderata were: rapid means of transport to town; adequate dimensions; and reasonably cheap grading and drainage. The author next dealt with surface preparation, layout of buildings and stores, and details of equipment, and concluded by references to the Aerodromes Advisory Board and future control.

Rectifiers in Railway Signalling.—The good attendance, especially of the younger members, at the Institution of Railway Signal Engineers on Wednesday evening last indicated the interest taken in the subject of the paper by Major L. H. Peter entitled as above. It was exceedingly well read, and at the close of the discussion, in which Messrs. W. Challis, C. W. Prescott, S. H. Chase and H. H. Dyer took part, the author replied with the freedom, clarity and fulness that had characterised the delivery of the paper. In the earlier part of the proceedings the President (Mr. R. S. Griffiths) announced that the Council had, that afternoon, made the awards for the student members' prize essays. The first prize had been given to Mr. B. S. Tinley Simpson, for an essay on Level Crossing Protection, and the second prize was awarded to Mr. A. J. Gillis for a contribution on the Economic Advantages of Railway Signalling. For the best papers read and discussed during the year, the Council

awarded the first prize to Mr. S. W. Spendlove for that entitled Some Developments in Advance Section Signalling, and the second prize to Major L. H. Peter for Some Notes on Centralised Traffic Control.

Southern Divisional Engineer's Staff Dinner, Southern Railway.

The second annual dinner of the Southern Divisional Engineer's staff took place at Brighton on January 11, when Mr. C. V. Hill, Divisional Engineer, presided over a large gathering. Mr. G. S. Findlay, Assistant Divisional Engineer, in proposing the health of "The Chairman" expressed the pleasure of the company at Mr. Hill's recovery from his long illness last summer, and Mr. Hill, in his reply, told how greatly he had been helped by his confidence that matters were left in such capable and conscientious hands as those of the members of his staff whom he took the opportunity of thanking for their consistently good work and loyalty. Mr. H. F. Russ, Chief Clerk, proposed the toast of

"The Guests," who were all old friends of the company present and whom they were glad to welcome back amongst them. This toast was responded to by Mr. H. E. Roberts, Eastern Divisional Engineer, Ashford, Mr. W. A. Messer, who had just retired from the position of Permanent Way Assistant to the Chief Engineer, and Mr. W. A. Willox, of THE RAILWAY GAZETTE.

Southern Railway Eastern Divisional Engineer's Staff Dinner.

On Thursday, January 10, the first dinner of the Eastern Divisional Engineer's staff took place at the County Hotel, Ashford, when Mr. H. E. Roberts, Divisional Engineer, presided over a gathering of exactly 100. Those present included Messrs. A. White (Divisional Superintendent), W. A. Messer, John Shaw, C. V. Hill (Southern Divisional Engineer), F. E. Campion (London, East, Divisional Engineer), and F. J. Wymer (Divisional Marine Manager). The toasts were interspersed with an excellent musical entertainment, and a thoroughly enjoyable time was spent.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 2nd Week			Totals to Date		
	1935	1934	Inc. or Dec.	1935	1934	Inc. or Dec.
L.M.S.R. (6,926 mls.)						
Passenger-train traffic...	355,000	352,000	+ 3,000	719,000	693,000	+ 26,000
Merchandise, &c. ...	428,000	439,000	- 11,000	797,000	820,000	- 23,000
Coal and coke ...	279,000	278,000	+ 1,000	501,000	519,000	- 18,000
Goods-train traffic ...	707,000	717,000	- 10,000	1,298,000	1,339,000	- 41,000
Total receipts ...	1,063,000	1,069,000	- 6,000	2,017,000	2,032,000	- 15,000
L.N.E.R. (6,339 mls.)						
Passenger-train traffic...	236,000	234,000	+ 2,000	496,000	474,000	+ 22,000
Merchandise, &c. ...	303,000	314,000	- 11,000	580,000	571,000	+ 9,000
Coal and coke ...	252,000	263,000	- 11,000	455,000	468,000	- 13,000
Goods-train traffic ...	555,000	577,000	- 22,000	1,035,000	1,039,000	- 4,000
Total receipts ...	791,000	811,000	- 20,000	1,531,000	1,513,000	+ 18,000
G.W.R. (3,750½ mls.)						
Passenger-train traffic...	159,000	157,000	+ 2,000	319,000	313,000	+ 6,000
Merchandise, &c. ...	176,000	171,000	+ 5,000	340,000	334,000	+ 6,000
Coal and coke ...	109,000	112,000	- 3,000	207,000	221,000	- 14,000
Goods-train traffic ...	285,000	283,000	+ 2,000	547,000	555,000	- 8,000
Total receipts ...	444,000	440,000	+ 4,000	866,000	868,000	- 2,000
S.R. (2,172 mls.)						
Passenger-train traffic...	238,000	232,000	+ 6,000	473,000	458,000	+ 15,000
Merchandise, &c. ...	54,000	59,000	- 5,000	103,500	107,500	- 4,000
Coal and coke ...	31,000	39,000	- 8,000	61,500	68,500	- 7,000
Goods-train traffic ...	85,000	98,000	- 13,000	165,000	176,000	- 11,000
Total receipts ...	323,000	330,000	- 7,000	638,000	634,000	+ 4,000
Liverpool Overhead ...	1,126	1,186	- 60	2,220	2,282	- 62
(6½ mls.)						
Mersey (4½ mls.) ...	4,254	4,420	- 166	8,832	9,171	- 339
* London Passenger Transport Board ...	526,100	525,300	+ 800	14,936,800	14,627,900	+ 308,900
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,979	2,000	- 21	3,563	3,562	+ 1
" " goods	427	458	- 31	744	768	- 24
" " total	2,406	2,458	- 52	4,307	4,330	- 23
Great Northern pass. (562 mls.)	7,950	7,100	+ 850	16,350	14,800	+ 1,550
" " goods	7,500	7,000	+ 500	14,850	14,000	+ 850
" " total	15,450	14,100	+ 1,350	31,200	28,800	+ 2,400
Great Southern pass. (2,158 mls.)	18,684	17,794	+ 890	39,080	37,444	+ 1,636
" " goods	41,412	28,336	+ 13,076	80,870	55,233	+ 25,637
" " total	60,096	46,130	+ 13,966	119,950	92,677	+ 27,273

* 28th week, the receipts for which include those undertakings not absorbed by the L.P.T.B. in the corresponding period last year; last year's figures are, however, adjusted for comparative purposes

British and Irish Railways Stocks and Shares

Stocks	Highest 1934	Lowest 1934	Prices	
			Jan. 16, 1935	Rise/ Fall
G.W.R.				
Cons. Ord.	66½	48½	50	-1½
5% Con. Prefce.	118	109	118½	+½
5% Red. Pref.(1950) ..	115	107	116½	+1
4% Deb.	117	105	116½	+1
4½% Deb.	119	109	119½	+2
4½% Deb.	129½	115½	128½	+1
5% Deb.	135	126½	138½	+4
2½% Deb.	75	64	80	+3½
5% Rt. Charge	1347½	123½	133½	—
5% Cons. Guar.	132¾	121¾	133	—
L.M.S.R.				
Ord.	30½	19½	20	-1
4% Prefce. (1923)	64½	41	48½	-1½
4% Prefce.	87	69½	86½	-½
5% Red. Prf. (1955) ..	107	92½	106	+½
4% Deb.	114½	100½	109½	+½
5% Red. Deb.(1952) ..	118½1½	111½	118½	—
4% Guar.	106½	96¾	105	—
L.N.E.R.				
5% Pref. Ord.	24½	13½	14½	-½
Def. Ord.	11½	67	7	-½
4% First Prefce.	76	59½	72½	-1
4% Second Prefce.	47	25½	28½	-1½
5% Red. Pref.(1955) ..	94½	80	91½	—
4% First Guar.	104	92	103	—
4% Second Guar.	97½	86½	98	+½
3% Deb.	90	74½	85½	—
4% Deb.	114	99½	109	—
5% Red. Deb.(1947) ..	117	108	117	—
4½% Sinking Fund Red. Deb.	111½	105½	110½	+½
SOUTHERN				
Pref. Ord....	90	63½	79	—
Def. Ord.	32½	19	21	-1
5% Prefce.	118½½	107½	119	—
5% Red. Pref.(1964) ..	115½	107½	114½	—
5% Guar. Prefce.	132	120¾	132½	+1
5% Red. Guar. Pref. (1957)	119½	113	120	+1
4% Deb.	116½	103½	115½	—
5% Deb.	134	124½½	134½	—
4% Red. Deb.	113½½	105½½	113	—
1962-67				
BELFAST & C.D.				
Ord.	6	5	5½	—
FORTH BRIDGE				
4% Deb.	110	100	109½	—
4% Guar.	110	100	109½	+1
G. NORTHERN (IRELAND)				
Ord.	9½	4½½	7	—
G. SOUTHERN (IRELAND)				
Ord.	25	12½	22½	+8
Prefce.	21½	13½½	25½	-2½
Guar.	48	39	58½	+½
Deb.	67	59	74½	+1½
L.P.T.B.				
4½% "A"	126	115	126½	—
5% "A"	135½	124½	137½	+1
4½% "T.F.A."	113½	107½	113	+1
5% "B"	131½	118	129½	+1
5% "C"	97	73	96	-2
MERSEY				
Ord.	15½	7	10	—
4% Perp. Deb.	93½	82½	93½*	—
3% Perp. Deb.	66½	61½	67½*	—
3% Perp. Prefce....	54	44½	48½	—

* ex dividend

CONTRACTS AND TENDERS

The L.N.E.R. has placed orders with Colville's Limited for 200 tons of steel for fishplates and R. Melvin Limited for the casting of 1,350 tons of permanent-way chairs.

Steel Sleepers for South Africa

The South African Railways & Harbours Administration has placed orders for steel sleepers for 80-lb. rails to the values named as follow:—Les Petits Fils de Fois de Wendel (£3,297 4s.); Stahlwerks Verband (£9,748 5s.); Soc. An. des Acières Micheville (£3,297 2s. 11d.); and Columeta Export Co. Ltd. (£12,328 13s. 4d.). (Order No. B6576.)

Federated Engineers Limited has received an order from the South African Railways & Harbours Administration for steel keys (Order No. B6557) at a total price of £318 15s.

Robt. Stephenson & Co. Ltd. has received orders from the Leopoldina Railway for one locomotive boiler for a rack engine and one pair of locomotive cylinders.

The British Thomson-Houston Co. Ltd. has secured from the Great Northern Railway of Ireland a contract for the supply of Mazda lamps during the twelve months ending December 31, 1935.

The Gloucester Railway Carriage & Wagon Co. Ltd. has received an order for two 4 ft. 8½ in.-gauge bogie carriage underframes for the British Guiana Government Railways, to be supplied under the inspection of the Crown Agents for the Colonies.

The Crown Agents for the Colonies have recently placed orders as follow:—

Howell & Co. Ltd.: Boiler tubes.
Bayliss, Jones & Bayliss Limited: Bolts.
Albion Motors Limited: Combined passenger and goods vehicle.
H. Morris Limited: Crane.
Guest, Keen & Nettlefolds Limited: Dogspikes.
Thos. Firth & J. Brown Limited: Locomotive tyres.
R. Hudson Limited: Railway materials.
Crossley Motors Limited: Spare parts for six-wheeled vehicles.
Tubes Limited: Steel boiler tubes.
South Durham Iron & Steel Co. Ltd.: Steel pipes.
P. & W. McLellan Limited: Steel plates.
British (Guest, Keen & Baldwin's) Iron & Steel Co. Ltd.: Steel sleepers.
British Steel Piling Co. Ltd.: Steel sheet piling.

Leyland Motors Limited has received orders from railway-associated road operators as follows: East Kent Road Car Co. Ltd.: 29 Tiger single-decked passenger vehicles; and Maidstone & District Motor Services Limited: Six oil-engined Titan gearless buses, 12 oil-engined Titans, and 21 Tiger single-decked vehicles.

Ivan Jones Limited has received an order from the Great Indian Peninsula Railway for 21 floodlight projectors, complete with visors, of the Crouse Hinds Company's make.

The English Electric Co. Ltd. has received an order from the Indian Stores Department for turbo-alternator sets, at a total price, including erection, of Rs. 2,34,764.

Guest, Keen & Nettlefolds Limited has received an order from the South

Indian Railway for 71½ tons of gibs and cotters, to the inspection of the consulting engineers, Messrs. Robert White & Partners.

The Associated British Machine Tool Makers Limited has received an order from the Indian Stores Department for one bolt, nut and rivet forging machine, at a total price of Rs. 15,993, f.o.r. Karachi.

The Harland Engineering Co. Ltd., through Martin & Company, has received an order from the Indian Stores Department for three sets of electrically-driven high lift pumping sets at a total price of Rs. 30,737.

Steam Breakdown Crane Order

Ransomes & Rapier Limited has received an order from the War Office for one Stokes self-propelling steam-operated 107-ton breakdown crane for service on the metre gauge. This crane, except in respect of gauge and lifting capacity, is generally similar to one of 105-tons capacity for the 4 ft. 8½ in.-gauge supplied earlier by the same makers and described and illustrated in the issue of THE RAILWAY GAZETTE of December 14, 1928, p. 768. It is mounted on eight wheels and is fitted with two six-wheeled relieving bogies and a four-wheeled match truck. Steam is taken from a Hopwood boiler supplied by Cochran & Co. Ltd. The test load for this crane was 126 tons.

Locomotive Boilers Required

The Agent, G.I.P. Railway, Victoria Terminus, Bombay, invites tenders, receivable by February 6, for six Y.6-type locomotive boilers, 28 H.S.10-type locomotive boilers, and two A.1-type locomotive boilers, narrow gauge.

The Stores Purchase Committee, Government of Mysore, invites tenders for locomotive, carriage and wagon spare parts required by the Mysore Railways during the year 1934-35. Tenders are receivable by the consulting engineers, Messrs. Rendel, Palmer & Tritton, 55, Broadway, Westminster, London, S.W.1, by February 15.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, invites tenders, receivable on the dates named, as follows:—

For one cold starting crude oil engine-driven vertical spindle tube well turbine pump (belt-driven), capable of pumping 4,500 gallons per hour against total head of 165 ft., required for the North Western Railway of India (February 18).
For a total of 1,498 pairs of broad-gauge disc wheels and axles and 40 pairs of 2 ft. 6 in.-gauge disc wheels and axles, required for the Eastern Bengal Railway (February 25).

The South African Railways and Harbours Administration is calling for tenders, to be presented in South Africa by March 4, for the supply of five or more 2-ton, and five or more 5-ton, four-wheeled welded-frame road trailers. Firms desirous of offering trailers of United Kingdom manufacture can obtain further details from the Department of Overseas Trade.

The Argentine State Railways Administration is calling for tenders, to be presented in Buenos Aires by February 14, for the supply of 24 motor trolleys; twenty metre gauge, two 1.435 m. gauge, two 1.676 m. gauge, and five spare motors. Firms desirous of offering trolleys of United Kingdom manufacture can obtain further details from the Department of Overseas Trade.

Forthcoming Events

- Jan. 18 (Fri.).—Railway Club, 57, Fetter Lane, London, E.C.4, 7.30 p.m. "The Eastern Section of the Great Central Railway," by Mr. E. B. Woodruffe-Peacock.
Institute of Transport (Leeds Graduate), at Church Inst., Albion Place, 7 p.m. *Speaker*: Mr. J. R. Tomlinson.
Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, 7 p.m. Internal Combustion Engine Group Meeting.
Jan. 21 (Mon.).—G.W.R. (Birmingham) Lecture and Debating Society, at Great Western Hotel, Snow Hill Station, 6.30 p.m. "The New Mersey Tunnel," by Mr. P. A. Allery, J.P.
Stephenson Locomotive Society (Scottish), at Royal Technical College, Glasgow, 7.30 p.m. "The Great Central Railway and its Locomotives," by Mr. D. S. Barrie.
Jan. 22 (Tues.).—Institute of Transport (Birmingham Graduate), at Imperial Hotel, 6.30 p.m. "Pleasure Traffic by Road," by Mr. G. A. E. Bradford.
Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "The Construction of Haifa Harbour," by Mr. E. J. Buckton. "The Development and Construction of the Port of Beira," by Mr. T. C. Frampton. "Saint John Harbour, New Brunswick," by Mr. A. Gray.
Jan. 23 (Wed.).—Institution of Locomotive Engineers (Birmingham), at Queen's Hotel, 6.45 p.m. "Motive Power Matters," by Col. H. Rudgard.
Diesel Engine Users' Association, at Caxton Hall, Caxton Street, London, S.W.1, 3 p.m. The Report of the Committee on Heavy Oil Engine Working Costs (1933-34).
L.N.E.R. (Darlington) Lecture and Debating Society, at North Road Inst., 7.20 p.m. "Timetables in Theory and Practice," by Mr. W. E. Green.
L.N.E.R. (Newcastle and Sunderland) Lecture and Debating Society, at Sunderland, 7 p.m. "Working of Traffic into and out of London Docks," by Mr. R. Gardiner.
Jan. 24 (Thurs.).—G.W.R. (London) Lecture and Debating Society, in General Meeting Room, Paddington Station, 5.45 p.m. Reading of Prize Essay. "New Demands for Transport; How they may be Created and Developed Profitably by the G.W.R."
Jan. 25 (Fri.).—Institute of Transport (Manchester - Liverpool), at Exchange Station Hotel, Liverpool, 6.30 p.m. *Speaker*: Mr. W. G. Marks.
Jan. 28 (Mon.).—Railway Students' Association (Edinburgh), at Goid Hall, St. Andrew Square, 8 p.m. "Some Features of Colour-Light Signalling," by Mr. R. Pollard.
Jan. 29 (Tues.).—L.N.E.R. (Middlesbrough) Lecture and Debating Society, at Grand Hotel, West Hartlepool, 7.15 p.m. "The Development of Goods Traffic," by Mr. R. B. Temple.
The British Railway Stockholders Union Limited, at Gatti's Restaurant, at 1 p.m. Address by Mr. William Whitelaw.
London Iron and Steel Exchange, at Grosvenor House, Park Lane, London, W.1. Annual Dinner.
Jan. 31 (Thurs.).—Institution of Locomotive Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. "Brakes for Streamlined Railway Vehicles," by Mr. W. F. McDermid.
L.N.E.R. (York) Lecture and Debating Society, at Railway Inst., Queen Street, 7 p.m. "Main Line Electrification," by Mr. K. R. Ellison.

OFFICIAL NOTICES

THE MADRAS & SOUTHERN MAHRATTA RAILWAY CO. LTD. invite Tenders for:—

542 PAIRS OF WHEELS AND AXLES FOR CARRIAGES AND WAGONS (178 Pairs Broad Gauge and 364 Pairs Metre Gauge).

Specification and Form of Tender can be obtained at the Company's Offices, 25, Buckingham Palace Road, Westminster, London, S.W.1. Fee ONE GUINEA, which will not be returned.

Tenders must be submitted not later than 2 o'clock p.m. on Tuesday, 5th February, 1935. The Directors do not bind themselves to accept the lowest or any Tender and reserve to themselves the right of reducing or dividing the order.

By Order of the Board
G. W. V. DE RHE PHILIPPE,
Secretary.

South Indian Railway Company Limited.

THE Directors are prepared to receive Tenders for the supply of:—

1. Steel Tyres.
2. Rolled Steel Disc Wheels & Axles.

Specifications and Forms of Tender will be available at the Company's Offices, 91, Petty France, Westminster, S.W.1.

Tenders addressed to the Chairman and Directors of the South Indian Railway Company, Limited, marked "Tender for Steel Tyres," or as the case may be, with the name of the firm tendering, must be left with the undersigned not later than 12 noon on Friday, the 1st February, 1935.

The Directors do not bind themselves to accept the lowest or any tender.

A charge, which will not be returned, will be made of £1 for each copy of Specification

No. 1 and of 10s. for each copy of Specification No. 2.

Copies of the drawings may be obtained at the Offices of the Company's Consulting Engineers, Messrs. Robert White & Partners, 3, Victoria Street, S.W.1.

A. MUIRHEAD,
Managing Director.

91, Petty France,
Westminster, S.W.1.
16th January, 1935.

SALES ENGINEER REPRESENTATIVE required by well-known London firm of Engineers. Sound connection Railway and Municipal passenger transport. Mechanical and electrical knowledge with proved commercial ability. Senior position and good prospects.—Write, stating experience, age, training and salary, in confidence, Box 17, c/o THE RAILWAY GAZETTE, 33, Tothill Street, London, S.W.1.

RAILWAY AND OTHER REPORTS

Glyn, Mills & Co.—The 101st statement of assets and liabilities as at December 31, 1934, of this famous private bank shows a strong position. The proportion of quickly realisable assets to the deposits of £38,137,375 is over 71 per cent. These assets consist of cash, £5,705,111; balances with other banks and cheques in transit, £1,648,978; money at call and short notice, £8,251,950; bills discounted, £757,681; and investments, £11,258,105, including £10,730,367 British Government securities. Advances to customers, &c., amount to £11,625,551, and bank premises at cost, less amounts written off, stand at £740,000. Total assets are £41,737,854. The total capital authorised and issued is £1,060,000, and the reserve fund stands at £530,000.

East Yorkshire Motor Services Limited.—Controlled jointly by the London and North Eastern Railway and Tilling and British Automobile Traction Limited, this company secured a total revenue of £251,061 for the year to September 30 last. The balance, after deducting expenses and depreciation, is £34,343, and adding £13,410 brought forward makes a total of £47,753. The directors propose to appropriate £10,000 to reserve and £20,000 to a dividend of 10 per cent. for the year, leaving £17,753 to be carried forward. An agreement has been entered into with the Hull Corporation for the co-ordination of road passenger transport services operated by the corporation and the company in and about the City of Hull. During the year land has been acquired at Anlaby Common for the extension of the company's repair works. An omnibus station is in course of erection at Bridlington.

Midland Bank Limited.—The directors report that, full provision having been made for all bad and doubtful debts, the net profits for the year 1934 amount to £2,292,217, which, with £866,483 brought forward, makes

£3,158,700, out of which the following appropriations, amounting to £1,403,376, have been made:—To interim dividend, paid July 16, 1934, for the half-year ended June 30, 1934, at the rate of 16 per cent. per annum less income tax, £883,376; to reduction of bank premises account, £250,000; to reserve for future contingencies, £270,000; leaving a sum of £1,755,323, from which the directors recommend a dividend, payable February 1 next, for the half-year ended December 31, 1934, at the rate of 16 per cent. per annum less income tax, £883,376; and a balance to be carried forward of £871,946. For the year 1933 the net profit was £2,266,846, the total available £3,126,243, and the dividend 16 per cent., after placing £550,000 to reserve.

United Automobile Services Limited.—This company, which is jointly controlled by the L.N.E. Railway and Tilling and British Automobile Traction Limited, secured for the year ended September 30, 1934, a profit of £84,499. Adding £31,390 brought forward, makes a total of £115,889. After providing for preference dividend (£10,500), directors' fees (£1,950), and capital issue expenses

written off (£1,291), there is a balance of £102,148. The directors recommend a dividend of 8 per cent. per annum on the ordinary shares, leaving £32,148 to be carried forward. The authorised capital was increased during the year to £1,150,000 by the creation of 250,000 ordinary shares of £1 each, and the issued capital increased by the allotment of 175,000 ordinary shares of £1 each. Many competing omnibus businesses have been acquired during the year. The subsidiary company, Blumers Motors Limited, has been liquidated and its business merged in that of the parent company. Erection of the head office buildings at Darlington and of the garage at Alnwick has been completed and they are in occupation.

Forthcoming Meetings

Jan. 22 (Tues.).—**Rohilkund & Kumaon Railway** (Ordinary General), 237, Gresham House, Old Broad Street, E.C., at 12 noon.

Jan. 29 (Tues.).—**South Behar Railway** (Ordinary General), 25, Buckingham Palace Road, S.W.1, at 12 noon.

Mar. 29 (Fri.).—**Zafra & Huelva Railway** (Ordinary General), Calle de Ayala 54, Bajo Derecha, Madrid, at 5 p.m.

Exports of Railway Material from the U.K. in Dec.

	Dec., 1934	Dec., 1933	Twelve Months Ending Dec., 1934	Dec., 1933
Locomotives, rail	113,037	14,387	453,290	734,428
Carriages and wagons	152,388	39,506	973,853	527,291
Rails, steel	30,371	13,677	996,044	481,837
Wheels, sleepers, fishplates and miscellaneous materials	111,599	91,673	1,212,042	838,490

Locomotive and rail exports included the following:—

	Locomotives		Rails	
	Dec., 1934	Dec., 1933	Dec., 1934	Dec., 1933
Argentina	—	842	5,175	6,361
Union of South Africa	—	3,780	34,795	35,732
British India	47,900	1,336	52,015	19,966

Railway Share Market

The stock and share markets, after an active commencement of business in the New Year, have developed some irregularity. Home railway traffic receipts have proved disappointing to the market which had been hoping for large increases, especially in the transport of coal. The warm weather conditions have operated against an increase in the movement of coal.

If there were to be a sudden development of sharp frost for a few weeks it would give such a stimulus to the demand as to bring about much speculative buying of the junior preference stocks of the London & North Eastern and of Great Western ordinary. Meantime, the publicity given to the claims to be put forward for a further restoration of the

"cuts" in wages is having its inevitable effect in keeping new buyers from coming forward for the preference stocks which, before the Christmas holidays, were in strong request by investors. The dividend declarations which will shortly be forthcoming are not exercising much influence on prices which have mostly discounted the anticipated increases. Great Western ordinary stock is fluctuating under the effects of uncertainty as to whether the Board will adhere to its previous policy of maintaining the 3 per cent. dividend so as to keep the companies' issues within the list of trustee securities. Current estimates in the market as to the actual earned dividend are only about 1 per cent. on the ordinary stock, but it is confidently anticipated that 3 per cent. will be paid for the year. It is being pointed out that the contingency fund which is available,

amounts to £1,822,057, or equivalent to over 4 per cent. on the ordinary stock, in addition to which there are other large reserves. Southern issues have not been affected by the intimation that the company is to apply for powers to raise £7,500,000 of new capital as the market takes the view that the company would have no difficulty in raising capital on the basis of 4 per cent. return to the investor or even less.

Transport Board "C" stock has reacted from the highest level recently reached and is now obtainable at a few points below par. It is expected recovery will not be long delayed. Recent selling came largely from quarters which had purchased the stock when much lower in price and with the object of obtaining capital appreciation rather than income. In foreign railway stocks Costa Rica issues were marked up.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1934-35	Week Ending	Traffic for Week		No. of Week	Aggregate Traffic to Date			Shares or Stock	Prices						
			Total this year	Inc. or Dec. compared with 1934		Totals		Increase or Decrease		Highest 1934	Lowest 1934	Jan. 1935	Yield % (See Notes)			
						This Year	Last Year									
South & Central America.	Antofagasta (Chili) & Bolivia	830	13.1.35	£ 10,350	-	£ 880	2	£ 17,750	20,500	-	£ 2,750	Ord. Stk.	265½	19	22	Nil
	Argentine North Eastern	753	12.1.35	6,925	+	1,086	28	207,077	248,249	-	41,172	A. Deb.	11	67½	9	Nil
	Argentine Transandine ..	111	—	—	—	—	—	—	—	—	—	6 p.c. Db.	52	45	50	8
	Bolivar	174	Dec., 1934	5,700	+	350	52	71,400	72,700	-	1,300	Bonds.	10	61½	10	Nil
	Brazil	—	—	—	—	—	—	—	—	—	—	Ord. Stk.	135½	107½	13	31½
	Buenos Ayres & Pacific	2,806	12.1.35	70,423	-	11,083	28	1,924,091	2,272,417	-	348,326	Ord. Stk.	161½	81½	9	Nil
	Buenos Ayres Central ..	190	23.12.34	\$89,500	-	\$22,700	25	\$3,030,800	\$2,919,400	-	\$111,400	Mt. Db.	23	10	21½	Nil
	Buenos Ayres Gt. Southern	5,085	12.1.35	167,371	-	323	28	3,494,061	4,365,975	-	871,914	Ord. Stk.	35	22	25½	Nil
	Buenos Ayres Western ..	1,930	12.1.35	43,427	-	7,492	28	1,166,059	1,472,813	-	306,754	"	27½	18½	22½	Nil
	Central Argentine ..	3,700	12.1.35	127,670	-	9,431	28	3,221,128	3,799,132	-	578,004	"	23	13½	15	Nil
	Do.	—	—	—	—	—	—	—	—	—	—	Dfd.	14	7	9	Nil
	Cent. Uruguay of M. Video	273	12.1.35	19,391	+	1,537	28	460,069	453,145	+	6,924	Ord. Stk.	151½	8	9	Nil
	Do. Eastern Extn.	311	12.1.35	5,240	+	1,553	28	96,791	86,963	+	9,828	—	—	—	—	—
	Do. Northern Extn.	185	12.1.35	2,430	+	730	28	51,507	48,356	+	3,151	—	—	—	—	—
	Do. Western Extn.	211	12.1.35	1,749	—	526	28	40,926	42,028	-	1,102	—	—	—	—	—
	Cordoba Central	1,218	12.1.35	28,230	+	370	28	831,050	1,056,680	-	225,630	Ord. Inc.	8	3	4	Nil
	Costa Rica	188	Oct., 1934	13,646	-	2,769	13	63,485	81,190	-	17,705	Stk.	303½	23½	31	67½
	Dorada	70	Nov., 1934	10,400	+	3,000	47	112,800	85,800	+	27,000	1 Mt. Db.	103	95	102½	5½
	Entre Rios	810	12.1.35	16,132	—	2,214	28	344,807	375,345	-	30,538	Ord. Stk.	21½	12	14	Nil
	Great Western of Brazil	1,082	12.1.35	11,100	-	1,200	2	17,700	20,700	-	3,000	Ord. Sh.	7½	3½	5½	Nil
	International of Cl. Amer.	794	Nov., 1934	\$365,862	+	\$18,171	47	\$4,311,914	\$4,125,766	+	\$186,148	1st Pref.	1/-	1/-	1/-	Nil
	Interoceanic of Mexico ..	225½	Dec., 1934	3,200	-	200	52	42,350	55,670	-	13,320	Stk.	125½	75½	81½	Nil
	La Guaira & Caracas ..	1,918	12.1.35	24,840	+	7,674	2	45,327	28,686	+	16,641	Ord. Stk.	145½	7	7½	Nil
Leopoldina	483	7.1.35	\$189,500	+	\$26,700	1	\$189,500	\$162,800	+	\$26,700	"	31½	1½	1½	Nil	
Mexican	319	Dec., 1934	13,508	+	1,866	26	65,833	57,230	+	8,603	"	112	7	11½	Nil	
Midland of Uruguay ..	401	31.12.34	13,123	+	1,235	52	256,066	147,158	+	108,908	Ord. Sh.	389½	51½	25½	Nil	
Nitrate	274	12.1.35	4,670	+	1,570	28	129,640	91,720	+	37,920	Pr. Li. Stk.	84	67	81½	7½	
Paraguay Central ..	1,059	Dec., 1934	61,978	+	7,227	26	371,516	329,691	+	41,825	Pref.	14½	8	9	Nil	
Peruvian Corporation ..	100	5.1.35	\$27,600	+	\$9,750	27	\$359,152	\$388,033	-	\$28,881	Pr. Li. Db.	75	70	70	7½	
Salvador	153½	6.1.35	28,253	+	1,168	1	28,253	27,085	+	1,168	Ord. Stk.	86	67	72½	5½	
Taitai	164	Dec., 1934	2,140	-	1,483	26	13,570	12,515	+	1,055	Ord. Sh.	21½	17½	13½	51½	
United of Havana ..	1,365	12.1.35	17,071	+	3,112	28	451,214	369,263	+	81,951	Ord. Stk.	6	2	3	Nil	
Uruguay Northern ..	73	Dec., 1934	1,528	+	230	26	7,294	7,383	-	89	Deb. Stk.	6½	3	5½	Nil	
Canada.	Canadian National ..	23,733	7.1.35	487,317	+	15,379	1	487,317	471,938	+	15,379	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	—	—	—	Perp. Dbs.	78½	51½	77	5½
	Grand Trunk	—	—	—	—	—	—	—	—	—	—	4 p.c. Gar.	104½	97½	103	3½
	Canadian Pacific ..	17,243	7.1.35	369,400	-	10,200	1	369,400	379,600	-	10,200	Ord. Stk.	185½	111½	13	Nil
India.	Assam Bengal	1,329	15.12.34	25,972	+	2,599	37	996,055	869,908	+	126,147	Ord. Stk.	88½	72	90½	35½
	Barsi Light	202	22.12.34	2,235	-	255	38	103,507	110,782	-	7,275	Ord. Sh.	104½	98½	104½	5½
	Bengal & North Western	2,113	22.12.34	52,993	+	348	12	544,404	560,140	-	15,736	Ord. Stk.	297½	262	293½	57½
	Bengal Doonars & Extension	161	22.12.34	2,867	+	57	38	113,468	113,171	+	297	"	125½	124	125½	50½
	Bengal-Nagpur	3,269	8.12.34	108,150	-	4,351	36	3,934,464	3,660,909	+	273,555	"	105½	96	104½	31½
	Bombay, Baroda & Cl. India	3,072	5.1.35	173,475	+	4,575	40	6,086,325	5,817,900	+	268,425	"	115½	108½	113½	55½
	Madras & South'n Mahratta	3,230	22.12.34	108,225	-	4,583	38	4,036,991	4,072,976	-	35,985	"	131½	122½	127½	7½
	Rohilkund & Kumaon ..	572	22.12.34	10,920	+	1,237	12	103,581	95,856	+	7,725	"	263	250	264½	6
	South India	2,526	15.12.34	77,514	+	9,266	37	2,941,039	2,890,835	+	50,204	"	119	115	114½	7
Various.	Beira-Umtali	204	Oct., 1934	61,135	+	11,206	4	61,135	49,929	+	11,206	—	—	—	—	—
	Bilbao River & Cantabrian	15	Dec., 1934	1,814*	+	628	52	19,947	18,980	+	967	—	—	—	—	—
	Egyptian Delta	621	31.12.34	7,177	-	1,670	39	180,254	177,088	+	3,166	Pr. Sh.	215½	12½	21½	4
	Great Southern of Spain	104	5.1.35	2,198	-	90	1	2,198	2,288	-	90	Inc. Deb.	4	3½	3½	Nil
	Kenya & Uganda	1,625	Dec., 1934	196,966	+	41,493	52	2,227,178	2,088,162	+	139,016	B. Deb.	50	33	48	75½
	Manila	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Mashonaland	913	Oct., 1934	117,273	+	22,700	4	117,273	94,573	+	22,700	1 Mg. Db.	101	91½	101½	41½
	Midland of W. Australia	277	Nov., 1934	15,075	+	2,507	21	71,429	65,112	+	6,317	Inc. Deb.	100	93	96½	4½
	Nigerian	1,905	1.12.34	62,449	+	11,626	35	1,131,681	952,515	+	199,166	—	—	—	—	—
	Rhodesia	1,538	Oct., 1934	189,559	+	29,458	4	189,559	160,101	+	29,458	4 p.c. Db.	1047½	97½	104½	31½
	South African	13,217	15.12.34	583,475	+	62,221	37	18,987,671	16,734,876	+	2,252,795	—	—	—	—	—
	Victorian	6,172	Aug., 1934	740,142	+	27,143	8	1,433,140	1,380,045	+	53,095	—	—	—	—	—
	Zafra & Huelva	112	Nov., 1934	11,562	+	636	47	127,888	123,827	+	4,061	—	—	—	—	—

Notes.—Yields are based on the approximate current prices and are within a fraction of 1½.

* Rebellion.

† Receipts are calculated @ 1s. 6d. to the rupee.

§ ex dividend.

Salvador receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rate of exchange and not on the par value.